

THE

VICTORIAN NATURALIST:

THE JOURNAL & MAGAZINE

OF THE

Field Naturalists' Club of Victoria.

VOL. XL.

MAY, 1923, TO APRIL, 1924.

Hon. Editor: MR. F. G. A. BARNARD.

The Author of each Article is responsible for the facts and opinions recorded.

Melbourne:

WALKER, MAY & CO., PRINTERS, 429-431 BOURKE-STREET
1924.

ILLUSTRATIONS.

	PAGE
Aquatic House-builders -	242
Alpine Stream in Rocky Valley	90
Australian Ground-Thrush at Nest	99
Bairnsdale and District, Map of	107
Bogong High Plains, Map of	88
Bronze Cuckoo, Young Narrow-billed	11
Butcher-Bird, Nest and Eggs	11
Butterflies from New South Wales and Queensland	230
<i>Celmisia longifolia</i>	90
<i>Choristemon humilis</i>	234
<i>Clematis glycinoides</i>	113
Concretionary Nodules, and Micro-Structure	9
Cradle Mountain (Tasmania) -	131
" " Dove Lake	132
" " Map of District	133
" " Cushion Plant Association	136
<i>Ewartia Meredithae</i>	136
Flea, The Sticktight	119
Gippsland Cave, A	79
<i>Hemidonax Chapmani</i>	10
<i>Prasophyllum Tadgellianum</i>	244
Protozoa -	73
River System West of Hamilton, Sketch Map -	119
Spiders, Prominent Features	170
Thrips -	57
Whipstick Scrub, Map of	196

ERRATA.

Page 48, line 9—For "*strictula*, Menke, sp." read "*striata*, Sow., sp."

Page 142, line 8.—For "*viridescens*" read "*iridescens*."

Page 187, line 21—For "*Hierochlon*" read "*Hierochloa*."

Page 187, line 18 from bottom—For "*Choretum*" read "*Choretrum*."

Page 244, line 21 from bottom—For "Bogong" read "Hotham."

NOTE TO BINDER.

Bind supplement (list of members, &c., in July *Naturalist*) at end of volume, following page 246.

The Victorian Naturalist.

VOL. XL.—No. 1.

MAY 10, 1923.

No. 473.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 9th April, 1923.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about fifty members and visitors were present.

CORRESPONDENCE.

From Mr. T. G. Sloane, "Moorilla," Young, N.S.W., thanking the Club for his election as a life honorary member in recognition of being one of the foundation members of the Club.

REPORT.

A report of the excursion to Beveridge on Saturday, 24th March, was given by the leader, Mr. F. G. A. Barnard, who stated that the excursion had been well attended, and the excursionists were very much interested in the physiographical features of Beveridge Hill, an extinct volcano with a very fine crater.

ELECTION OF MEMBERS.

On a ballot being taken, Mrs. Shiels, Lisson-grove, Hawthorn, and Mr. J. R. T. Mannix, Botanical Department, University, were duly elected as ordinary members of the Club.

GENERAL BUSINESS.

Mr. F. G. A. Barnard said that a deputation of nature-lovers would wait on the Chief Secretary on Wednesday, 11th April, with regard to further protection being afforded to certain of our native animals and birds, and asked any members interested to make a point of attending.

A letter was read from Mr. T. G. Sloane, of "Moorilla," Young, N.S.W., urging the Club to do what it could towards securing the permanent reservation and exemption from grazing licences of all land above the 4,000 feet level in South-Eastern Australia. This area contains the sources of a number of important rivers, and by its use as grazing areas is gradually being denuded of its timber, and thus rendered less useful as gathering grounds for streams.

Dr. C. S. Sutton supported Mr. Sloane's statements, and suggested that a copy of the letter be forwarded to the Forest League, and that the Club join with the League in any action that may be decided upon.

Mr. C. L. Barrett, C.M.Z.S., asked whether arrangements had been made for enlarging the *Naturalist*.

The hon. editor, Mr. F. G. A. Barnard, called attention to the paragraph at the end of the current number, and said that he hoped members would come to his assistance and forward sufficient notes every month to make up a twenty or twenty-four page journal. He could not guarantee any enlargement on his own account. Messrs. Hardy, Best, Williamson, and others spoke on the desirableness of increasing the size of the *Naturalist*.

PAPERS READ.

1. By Mr. J. Stickland, entitled "Notes on the Protozoa of the Melbourne District."

The author, by means of enlarged drawings, gave a general outline of the classification of the Protozoa, and referred to those forms to be met with in and around Melbourne.

2. By Messrs. J. H. Gatliff and C. J. Gabriel, entitled "Description of a New Marine Bivalve Shell for Victoria."

The authors described a small shell as *Hemidonax Chapmani*, of which, though many single valves had been found from time to time along the ocean beach, San Remo, and in other places, a complete specimen had only recently been found. It was named in honour of Mr. F. Chapman, A.L.S., palaeontologist of the National Museum, Melbourne, in recognition of his very great interest in marine conchology.

NATURAL HISTORY NOTES.

Mr. P. R. H. St. John stated that an albino form of the Blue Wren, *Malurus cyaneus*, Ellis, has recently been seen on several occasions in the Footscray Park by the curator, Mr. H. Matthews.

Mr. C. Oke gave an interesting account of the way in which an Argiopid spider, *Araneus capitalis*, L. Koch, spins its web. This is done by the female soon after sunset each evening, and is removed before daybreak.

EXHIBITS.

By Mr. Chas. Barrett.—Land shells, *Helix bipartita*, Ferussac, collected by Mr. Sidney W. Jackson at Tinaroo, Barron River, Cairns district, North Queensland; and *Helicella separata* (introduced), found in great numbers under stones, in tea-tree scrub, between Middle Brighton and Brighton Beach.

By Mrs. Coleman.—*Thelymitra venosa*, collected on Mount Bogong by Mr. A. G. Hooke, 10/2/23, growing in a wedge of sphagnum moss, a little soil being added to fill the pot. (Other specimens collected from Mount Buffalo in January and planted in soil only have sent up rather less vigorous shoots.)

By Messrs. J. H. Gatliff and C. J. Gabriel.—New Victorian

marine shell, *Hemidonax Chapmani*, Gatliff and Gabriel, in illustration of paper.

By Mr. L. Hodgson.—Flowers of *Lepidospermum scoparium*, var. *grandiflorum* *rosea*, a rare variety, grown at Bayswater from seed found in New South Wales about five years ago (first recorded in 1817 from seed sent to England).

By Mr. A. L. Scott.—Striated pebbles and glacial conglomerate, both from Werribee Gorge, Bacchus Marsh.

By Mr. J. Stickland.—Drawings of various forms of Protozoa, in illustration of his paper.

After the usual conversazione the meeting terminated.

EXCURSION TO BEVERIDGE.

Few, if any, of the many hundreds who pass Beveridge in the Sydney express and other trains every day have any idea of the interest attached to that comparatively low, hollow-backed hill to be seen about three-quarters of a mile to the west of the station. Saturday, 24th March, was not an ideal day for our excursion, but I think all who went were well satisfied with the outing. Beveridge Hill, as I prefer to call it, is officially known as Mount Bland, having been named by Hume and Hovell on that memorable first trip from Goulburn to Port Phillip, they having reached it on 14th December, 1824; and, as it forms a conspicuous feature in the district, they bestowed upon it the name of one of their patrons, Dr. Bland, of Sydney. As we approached the hill a slight shower occurred, but soon passed away. Beveridge is 25 miles from town and 989 feet above sea-level, and we found by barometrical observations that the highest point of the hill was about 420 feet higher. The ascent on the south-eastern side is not very steep. When the top was reached a vast amphitheatre, about a quarter of a mile across and sixty feet deep, revealed itself as the site of an extinct crater, perhaps responsible for much of the lava now forming the plains between it and the city. The crater is well defined, the floor measuring about 180 yards across. We walked round on the ridge to the new trig. station on the northern crest, and from there made a survey of the surrounding country. Unfortunately, the day was too dull and cloudy to pick out all that can be seen from it on a clear day, and it was with difficulty that we just made out the You Yangs, about fifty miles away. Of course, the Plenty Ranges, near at hand, were the most prominent of the many hills occupying the landscape. Having watched the Sydney express, looking like a toy train, laboriously climb the incline towards Wallan, we descended into the crater and over

the southern lip (the main breach is to the north-west) to the homestead at the foot, where we were kindly furnished with hot water, and were able to have an *al fresco* cup of tea, &c., before making for the station. The farm here is known as "Mount Fraser," hence the hill appears on Broadbent's map as "Mount Fraser." If we had missed the view from the top we were amply rewarded by a beautiful sunset, the colours of which require an artist's eye to describe. The station was reached in time for the 7.15 p.m. train, and by 9 p.m. we were saying good-bye to one another at Spencer-street. I would like to suggest, as a future excursion, that about the 14th December, 1924, the committee arrange to again visit the hill, and to invite the Historical Society to join in celebrating the hundredth anniversary of Hume and Hovell's visit to the hill. An account of the last Club visit, on 13th March, 1909, will be found in the *Naturalist* for May, 1909 (vol. xxvi., p. 4), in which greater detail is given.—F. G. A. BARNARD.

IN the Trans. Roy. Soc. S.A., vol. xlvi., 1922, Professor Osborn gives a sketch of the ecology of the Franklin Islands, a small group lying between Fowler's and Streaky Bay, towards the eastern end of the Great Australian Bight. These are low-lying, waterless, and composed of granitic rock covered with travertin and sand. Only thirty-four species of plants were observed there, mostly grasses, composites, and salt-bushes. All are found in this State. Professor Osborn concludes that the vegetation is in process of degeneration, chiefly from the burrowing of birds, and that it is fated to disappear utterly.

"THE GUM TREE."—With the current number of the *Gum Tree* (March, 1923, vol. vii., No. 25) is issued a representation in colour of probably the finest specimen of a Scarlet-flowering Gum, *Eucalyptus ficifolia*, F. v. M., in the world. The tree is about thirty-three years old, and is now in its prime. It stands on the lawn in front of the club-house of the Metropolitan Golf Club at Oakleigh, near Melbourne, Victoria. When in full flower (as depicted in the illustration) there is perhaps no finer sight of its kind in the world. The tree is a very shapely specimen, being about thirty feet in spread of branches and the same in height. This species of eucalyptus is remarkable in many ways. In its restricted native habitat in the south-west of Western Australia it is a comparatively small tree, growing in tangled masses.* It seems to have improved in cultivation, and this particular specimen is worth travelling many miles to see when in bloom in January of each year.

* Maiden, "Critical Revision of the Genus *Eucalyptus*," part 43, and *Vict. Nat.*, April, 1921, vol. xxxvii., p. 142.

ON CONCRETIONARY LIMESTONES IN GENERAL, AND
ON PEBBLES FROM LAKE OMEO IN PARTICULAR.

By F. CHAPMAN, A.L.S.

(With Plate.)

(Read before the Field Naturalists' Club of Victoria, 12th Mar., 1923.)

I.—INTRODUCTORY.

SOME months ago, after reading his joint paper on "Where the Murray Rises,"* Mr. Chas. Daley, B.A., F.L.S., kindly handed over to me for examination some of the pebbles which he had collected from the shores of Lake Omeo whilst on a recent trip with Messrs. Williamson, Hughes, and Allen.

As I have been interested for many years in that much-neglected study of our so-called concretionary and chemically-formed limestones, a large percentage of which, I have good evidence to believe, are formed directly or indirectly through organic agency, it seemed an opportune moment to study these pebbles from Omeo and to give my results, with some general remarks on more or less similar limestones, to this Club.

Definitions of Concretionary Limestones.—Limestones, as we all know, may be formed in different ways. For example, by the deposition of carbonate of lime (CaCO_3) upon a foundation of leaves and twigs, as an encrustation. This is seen in the "fossil forest" of Sorrento, &c., where the tea-tree scrub has been invaded by a drift of calcareous sand, subsequently partially dissolved and re-deposited on the vegetation; or as in the Oaky Creek at Yass, where leaves of Peppermint and *Casuarina* cones are encrusted.† Or we may have a purely chemical deposit of CaCO_3 , as in some banded travertins laid down by springs, as seen in our older sand-dunes along the Victorian coast, as at Warrnambool, Torquay, and Point Roadknight; also as stalagmites and stalactites in limestone caves, and pebbles on the floors of such places.

But probably the most important method of the formation of concretionary calcareous deposits is in the case of the limestones which are partially or wholly composed of nodular, cylindrical, or tuberose bodies more or less compacted to rock, but sometimes free or incoherent, as in the pink nodular limestone of the Mallee and South Australia and in the nodules such as we have on the shores of Lake Omeo.

Most of the text-books, ancient or modern, usually appear to avoid the description of concretionary limestone, and one

* Daley and Williamson, *Victorian Naturalist*, May, 1922, vol. xxxix., No. 1. Part I.: Physiographic and General Notes, Chas. Daley, pp. 4-12.

† A. J. Shearsby, "Notes on the Occurrence of Recent Travertin Formations in Oaky and Ravenswood Creeks, N.S.W.," *Vic. Nat.*, vol. xxxvii., 1920, p. 35.

text-book of sedimentary petrology does not mention the term. Oolitic structure, one of the forms of organic concretionary limestone, is well described in Harker's "Petrology,"* and there is also a good descriptive paragraph of such by Howchin in his "Geology of South Australia."† Speaking of the formation of oolitic and pisolithic structures of limestone, Prof. Howchin says:—"This process can be seen in operation at the present time in the formation of the 'limestone' in the neighbourhood of Robe, where oolitic and pisolithic limestones are now in course of formation on the floors of shallow lakes between the sand-hills. . . . It is frequently seen in the limestone of the Flinders Ranges (Upper Cambrian), and is sometimes present in the 'pink' limestone of Brighton (S.A.)."

From his description, Howchin appears to assume that the carbonate of lime deposit is chemically precipitated on a nucleus of the alga *Girvanella*, a foraminifer, or other object. I am inclined, however, to think that the bulk of the deposit in these Pleistocene and Holocene accumulations is through organic agency. The structures of the lime-secreting blue-green algae (*Cyanophyceæ*) are often excessively minute, and the thallus, when broken up by solution of the cellulose, forms a powder which cannot be distinguished from a "chemical precipitate." When, however, the stages from the one amorphous condition into the other organic thread-like structure is seen, the conclusion is obvious.

II.—BRIEF NOTES ON SOME AUSTRALIAN CONCRETIONARY LIMESTONES.

1. *Hard Concretionary Limestone Obtained in the Mallee Bores.*—This peculiar form of limestone is generally of a pink to pale brown colour, due to a minute quantity of ferric oxide included in it. It seems to form extensive bands in the upper strata (Pleistocene and Holocene) of the Mallee and Wimmera districts, and was met with in several of the sub-artesian Mallee bores at varying levels.‡ A note given in the report below referred to states that ||:—

"At several levels down to 90 feet, hard, calcareous, and concretionary limestone bands occur. One bed in particular, at 56-69 feet, appears to be a deposit such as is found at the present day in and around the saline lagoons in Central and parts of Southern Australia, which are inhabited by mollusca such as *Coxiella*, *Bulinus*, and other forms living in brackish

* Harker, A., "Petrology for Students," 2nd ed., 1897, pp. 247-249.

† "Geology of South Australia," 1918, p. 178.

‡ See Chapman, F., "Cainozoic Geology of the Mallee and Other Victorian Bores," Rec. Geol. Surv. Vict., vol. iii, part 4, 1916, pp. 345-347, 350, 354, 358, 375, 380.

|| Op. cit., p. 353.

water. These limestone deposits, found a little below the surface nearly all over the Mallee, are in all probability due, as explained by Howchin and Gregory,* to the effect of the hot sun and dry wind causing the evaporation of the surface moisture (sometimes one inch per day), and consequent upward suction of water charged with calcareous matter (sometimes ferruginous) from the lower depths. The deposition of this mineral matter takes place just beneath the surface of the loose soil, and results in a hard 'pan.'

With regard to this limestone, which can also be seen in its loose, nodular state in the Ooldea (on East-West Railway) district of South Australia, my views have been somewhat modified since the above was written. It will be remembered that Prof. Tate referred to the nature of the "biscuit" limestone of South Australia in his note at a meeting of the Royal Society of South Australia.† He there stated that a freshwater shell (*Bulinus*) can often be found as a nucleus of the flat, discoidal, limestone biscuits. This, together with other evidence from the Mallee concretionary limestones, shows the starting-point of the limestone biscuit, nodule, or other form is in a swamp or lake where the organic encrustation is likely to flourish. Their subsequent shapes seem to largely depend on the varying amount of rolling or skimming in the face of the wind to which they have been subjected. But it may be taken for granted that the further growth of the nodule does not take place until it comes to rest, or partially so, in a brackish lake. This surmise, founded on the facts before us, points in the direction of an organic origin for these concretions. And so it must have been, and, in fact, now is to a large extent, for the Lake Omeo concretions.

The examination of this hard Pleistocene limestone of the Mallee in thin sections under a high power of the microscope confirms the idea that the rock is almost purely of organic origin. Shells and ostracod valves are seen to be enwrapped with a finely granular deposit which has all the appearance of a disintegrated calcareous plant thallus, and which bears positive evidence of its organic origin by being riddled through in places by the parasitic boring fungus allied to *Achlya*. Under a low power the generally laminated character of an encrusting plant organism can be clearly seen. The rock itself is often a perfect aggregate of these nodules, large and small, the interstices being filled in with detrital material, of sand, including sharp to well-rounded (wind-worn) quartz grains.

* Gregory, J. W., "Geography of Victoria," new ed., 1912, p. 94; also Howchin, W., *Trans. R. Soc. S. Australia*, vol. xxvii., part 1, 1903, p. 84.

† *Trans. Roy. Soc. S. Australia*, vol. xxii., 1898, p. 236.

2. *Note on a Calcareous Concretion from the Pleistocene of Kangaroo Island, S.A., collected by Mr. A. G. Campbell in 1905.*—I made a thin section of this rock at the National Museum many years ago, and it was kept for future reference. It throws a clear light on the origin of this style of concretion. Under the microscope it is seen to consist of numerous tiny balls of laminated structure, some measuring not more than 2 mm. in diameter, and all welded together by other enwrapping algae. The vertical thickness of the laminae in this example measures about .026 mm. Very often the thallus shows it to have been perforated with a boring fungus, the cavities of which are of a deep rich brown.

III.—ON A CHEMICALLY-DEPOSITED ACCRETION.

Some calcareous nodules collected by Mr. W. H. Ferguson, of the Victorian Geological Survey, from the Murrindal Caves, near Buchan, have been examined by me, but the full note has not yet been published.* The nodules are rounded to sub-spherical, and measure about half an inch to one inch in diameter. They are composed of numerous coats of varying density and colour, and are wholly crystalline, excepting for the nucleus, which consists of a fragment of igneous rock. These nodules are "formed from rolling fragments of débris, which are slowly covered by a deposit of travertin in regular layers."

IV.—A DESCRIPTION OF SOME PEBBLES FROM THE SHORES OF LAKE OMEO, N.E. GIPPSLAND, COLLECTED BY CHAS. DALEY, 1921.

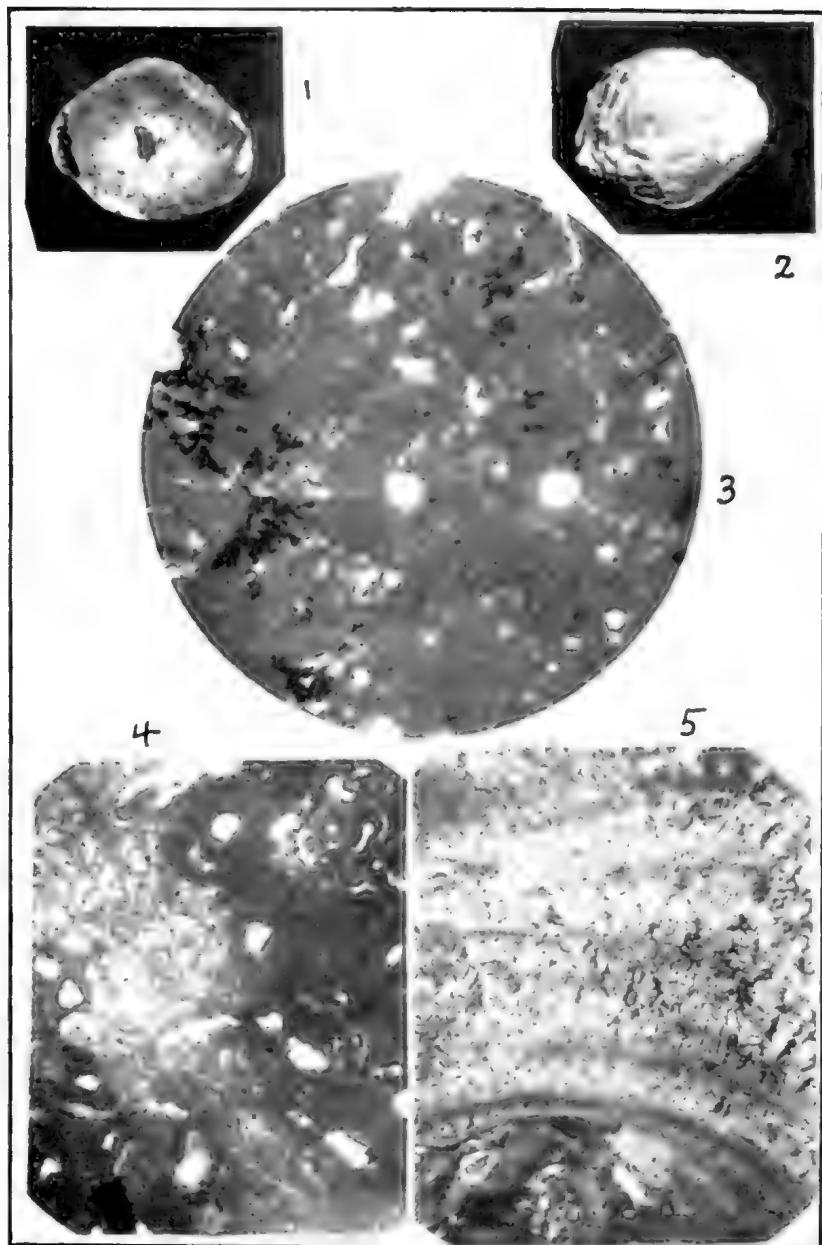
The specimens submitted to me have an average diameter of 2 to 3 cm. In colour they are pale grey to light ochreous, and externally have an earthy appearance, although they are hard to break open.

Under a low-power lens they show little or no concentric structure, excepting on the outer layers, which, by the way, are more ochreous than the inner.

They show a decided tendency to fracture along irregular joints, which, when the nodule is broken, exhibit on their surfaces minute clusters of dendrites (hydrous protoperoxide of manganese = H_2MnO_4) or Psilomelane.

The main part of the nodule, under magnification, consists of a kind of travertin paste, in which are embedded numerous organic remains. Their structure, however, is in most cases so altered by re-crystallization that it is difficult to specify

* The Director of the Victorian Geological Survey has given permission for this preliminary reference to be published (sent in 12/1/16).



CONCRETIONARY NODULES AND MICRO-STRUCTURE.
F. C. Photo.

any particular organisms. We may say with certainty that calcareous algae are present in considerable quantity. Some of these may be siphoneaceous in character, whilst others are presumably of the nature of *Characeæ*. In one instance a tubular stem is sliced through vertically, and showing the granular-calcareous walls of a lime-secreting plant. In another instance we have horizontal sections of a hollow stem surrounded by a zone of trapezoidal outgrowths.

Remains of minute crustacea may be represented by fragments of the carapace and spinous appendages, and may possibly belong to the *Cladocera*. The altered shelly fragments seem to be referable in some cases to minute mollusca. There are also some puzzling, rotaline-looking tests present, which suggest foraminifera, and the only solution would be to surmise that they were washed out of older sedimentary rocks of the surrounding limestones. There is no doubt, however, that the nodules themselves are of quite recent date.

In concluding these brief notes, I would suggest the further study of these concretionary bodies forming limestones as a fruitful field of research. Its importance needs no emphasis from me, seeing that such a vast amount of material in the Australian sedimentary series is made up of these so-called concretionary limestones.

EXPLANATION OF PLATE.

Fig. 1.—A split concretionary nodule from Lake Omeo, showing a dark ferruginous nucleus and a rudely concentric structure; collected by Mr. Chas. Daley. Nat. size.

Fig. 2.—Superficial aspect of a similar nodule from Lake Omeo. Nat. size.

Fig. 3.—Micro-section of nodule from Lake Omeo, showing dendritic structure and included organisms. $\times 16$.

Fig. 4.—Micro-section of a calcareous concretionary nodule from Kangaroo Island, S.A., showing bundles of tubes of the thallus of lime-secreting algae, also other included organisms; coll. by Mr. A. G. Campbell. $\times 16$.

Fig. 5.—Micro-section of a chemically-deposited nodule from the caves at Murrandal, Buchan, showing the nucleus at base of a fragment of igneous rock, and the successive coats of aragonite (?) crystals forming zones of growth; collected by Mr. W. H. Ferguson; reproduced by permission of the Geological Survey of Victoria. $\times 16$.

THE Saw Banksia, *B. serrata*, is found in the coastal district of southern New South Wales and Victoria as far west as Wilson's Promontory. In Tasmania it occurs only at the Sisters' Hill, on the North-West Coast, near Table Cape, where several specimens are growing on an area only a few acres in extent.

ON A NEW MARINE BIVALVE SHELL, *HEMIDONAX CHAPMANI*, SP. NOV.

BY J. H. GATLIFF AND C. J. GABRIEL.

(Read before the Field Naturalists' Club of Victoria, 9th April, 1923.)

HEMIDONAX CHAPMANI, sp. nov.

Shell solid. Ovate triangular; inaequilateral; radiately striate, the striae becoming stronger at the anterior angle, but towards the posterior end they gradually become broader and flatter, and are not continued beyond the rounded angle. Margin crenulate, and denticulate within on the ventral margin.

White, with discontinuous brown rays. Interior has usually, in adults, a large, triangular, purple blotch descending from the umboes.

Dimensions of Type.—Anterior-posterior diameter, 24 mm.; dorso-ventral, 15 mm.

Habitat.—San Remo, ocean beach, Victoria.

Observations.—We have collected very many valves of the above species, but only in one instance have we found a conjoined pair, and it is not half grown, and is uncoloured. Neither have we met with the shell in our numerous dredgings in Western Port.

It is the species listed by Pritchard and Gatliff as *Donax cardiodoides*, Lamärck. They followed the identification of Prof. Ralph Tate, and they received similar odd valves, much worn, that were obtained at Royston Head, Spencer's Gulf, South Australia.

In the *Victorian Naturalist*, vol. xxxi., page 83, we quoted this species as "being *H. australiense*, although it is much smaller, and might be considered distinct." Mr. Charles Hedley, F.L.S., has drawn our attention to the fact that it is distinct.

We have great pleasure in dedicating it to Mr. Frederick Chapman, A.I.S., palaeontologist at the National Museum, who, in the various branches included in the science he studies, has done such excellent work respecting our marine mollusca of past ages.

The valves figured are not quite the same size; the measurements refer to the larger valve. The figures are enlarged.

Type in Mr. Gatliff's collection.

BIRD NOTES.

Cuckoos.—Interest in the habits of Cuckoos has been deepened by the observations recorded in "The Cuckoo's Secret" and the photographs that illustrate this remarkable book. Mr. Edgar Chance, the author, an English ornithologist, is convinced that *Cuculus canorus*, the common Cuckoo of British

PLATE II.



HEMIDONAX CHAPMANI, GATLIFF AND GABRIEL, n. sp.
(Enlarged.)



YOUNG NARROW-BILLED BRONZE-CUCKOO, *Chalcococcyx basalis*, Horsfield.

Photo. C. BARRETT.



NEST AND EGGS OF BUTCHER-BIRD, *Cracticus destructor*, Temm.

Photo. C. BARRETT.

bird-books, always lays its eggs direct into the victim's nest, "or into the opening to or mouth of such nest, and never inserts its own egg by way of its beak into the victim's nest." Further, he contends that "every species of Cuckoo, Cow-bird, or other parasitic bird in any part of the world also lays its eggs direct into the victim's nest in the aforesaid manner, and never inserts its own egg by way of its beak."

Here is a pretty problem for Australian bird-observers to solve. Some claim that certain Australian Cuckoos, notably the Fan-tailed, *Cacomantis flabelliformis*, lay their eggs on the ground, and deposit them from the beak in the domed nests which they favour. It is generally believed, however, that the Pallid Cuckoo, *Cuculus pallidus*, selecting open, cup-shaped nests, lays its egg directly into them. A Cuckoo of this species has actually been seen sitting upon the nest of a Scarlet-breasted Robin, *Petroica multicolor*. I have found, often, an egg of the Fan-tailed Cuckoo in a nest of the White-browed Scrub-Wren, *Sericornis frontalis*, and wondered how it was deposited without the "door" of the nest being enlarged. Mr. Tom Fisher informs me, however, that he has more than once observed both Fan-tailed and Bronze Cuckoos, *Chalcoecetes plugosus*, clinging to domed nests, and has clear evidence that the eggs are deposited in the manner described in "The Cuckoo's Secret." I am inclined to believe that in all cases where domed nests are selected by Cuckoos this is the method adopted. In a letter to me, Mr. Edgar Chance states:—"I quite agree that it is impossible for a Cuckoo in all circumstances to lay her egg *in* the nest, but I am now firmly convinced, just as are several other enthusiasts over here (England), who have studied the subject with me, that all Cuckoos invariably lay their eggs *into* the nest, even when they cannot sit upon the nest to lay."

It would be interesting to know the views of any members of the Club who have paid attention to the habits of our Cuckoos. We have yet a great deal to learn concerning these parasitic birds, and every observation is worth recording.

BUTCHER-BIRDS.—The autumn song of the Butcher-bird, *Cracticus destructor*, is now being heard in districts near Melbourne, and even some of the outer suburbs. Though a fine songster, this species is "red in beak and claw." I have seen one darting upon a Blue Wren, *Malurus cyaneus*, and when Acanthizas and other small birds hear the notes that please our ears they fly to cover. But there is something in favour of *C. destructor* as a hunter: it preys upon rats and mice as well as little birds.

As it is proposed to devote a page, at least, in each issue of the *Naturalist* to bird notes, I hope that bird-lovers will

keep the editor supplied with items of general interest.—CHARLES BARRETT.

During the last six months many northern birds that rarely come south have appeared in the lightly-timbered country around the eastern suburban areas. It is quite apparent that the severe drought now raging throughout Australia has caused a general migration of birds towards the sea coast.

As early as 14th October a White-necked Heron, *Notophoyx pacifica*, appeared on Gardiner's Creek, where it remained for a few days, and then suddenly disappeared. However, it was subsequently found dead with a rifle bullet through its neck. This was an unfortunate occurrence, as this was probably the bird that had been visiting that locality for years past.

During the same month a small flock of White-browed Wood-Swallows settled in some box saplings. Here they nested freely in the *Bursaria spinosa* and *Acacia armata* bushes, and only left the district at the end of January. A solitary Masked Wood-Swallow was observed in the above flock when first noticed, but a week later this bird greatly exceeded the White-browed in numbers. They made but a brief stay, and not a bird remained after the end of November.

Four Nankeen Night-Herons, *Nycticorax caledonicus*, all in cinnamon-coloured plumage, were flushed from some dense tea-tree scrub bordering the Gardiner's Creek. Though these birds are regarded as nocturnal, they are almost equally as alert during the daytime as their congener, the White-fronted Heron.

The beautiful Regent Honey-eater, *Meliphaga phrygia*, which comes south at irregular periods, was noted on 22nd November. Other birds soon became aware of this bird's arrival owing to its pugnacious habits. Any bird that happened to come into close quarters with the Regents was furiously attacked and driven some distance away. In all, three pairs frequented the locality for nearly three months, when they gradually disappeared.

Both the Brown, *Cincloramphus cruralis*, and Rufous, *Cincloramphus rufescens*, Song-Larks arrived during October, and remained till the end of December and early February respectively. The former bird frequented the open grass-lands, and only perched on fences on very rare occasions. The Rufous Lark spent most of its time in trees or singing in the air. The female is barely more than half the size of the male.

Stubble Quail, *Coturnix pectoralis*, appeared more plentiful than in previous years, but this may be accounted for by the luxuriant growth of grass that existed in the district during the spring months. When the grass dried the birds became

scarce, and eventually the whole of them disappeared. One particular pair had reared a brood by the end of November, and the young ones had just left the nest when I came unexpectedly upon them. The old bird, who was with them, immediately made a short flight, and the young concealed themselves so well that they could not be disturbed or found.

On two separate occasions a Black-shouldered Kite, *Elanus axillaris*, was seen disturbing Starlings. They were probably different birds, as one was seen in November and the other in January. Their white plumage harmonizes so well with the grey atmosphere that they become almost invisible at a short distance away.

Probably the rarest bird seen during the time under review was the Yellow-plumed Honey-eater, *Ptilotis ornata*. This bird was seen only once, and, although frequent searches were made, I could never locate it again. It is readily distinguished from the White-plumed Honey-eater, *Ptilotis penicillata*, which it greatly resembles, by its streaked breast and prominent yellow plumes.

In addition to the migratory birds, the locality was well represented with numerous stationary species. Undoubtedly last season proved extremely rich, not only in ornithology, but in botany and entomology.—D. DICKISON. East St. Kilda.

MICROSCOPY AND AQUATIC BIOLOGY.

Now that the winter evenings are approaching, what better way of passing them could be imagined than by microscopical study? Objects of interest are so easily procured, even in the household itself, the garden, or the pond; and then what a world of beauty and variety of form is opened up to us! One of my most enthusiastic—and, I might add, voluminous—correspondents is a man who, at the age of fifty-eight, had his first glimpse of Nature through the microscope, and was so impressed with what he saw that he immediately became the possessor of an instrument, and spends most of his leisure time—when not writing descriptions of what he saw and asking information about them—in the study of pond-life.

One of the most widely-distributed organisms, and one that can be collected all the year round, in some localities, is *Volvox*. At times it is so plentiful that the collecting net is filled with them at every dip; and what exquisite objects they are under a low power of the microscope! Beautiful crystal spheres studded with emeralds, gracefully revolving beneath our gaze. *Volvox* is one of those interesting organisms on the border line between plants and animals. It was formerly claimed by the botanist as a green algæ. Really, it is a type of

flagellate infusorian, and its place in Nature is between the single-celled Protozoa and the Metazoa, or many-celled animals.

Volvox consists of numerous biflagellate individuals connected by a fine network of protoplasmic threads, and embedded in a gelatinous matrix, from which their flagella project, the whole forming a hollow, spherical, actively mobile colony.

There are two species of *Volvox* found in our ponds—*V. aurens* and *V. globator*—distinguished by the shape of their individual cells, each of which contains a nucleus and a contractile vacuole. At the hyaline end of the cell where the flagella are inserted there is a pigmented spot—the so-called "eye-spot"; the rest of the cell is green, owing to the presence of chlorophyl corpuscles. In consequence of the presence of these, *Volvox* is *holophytic*—that is, it feeds as a plant does. In its method of reproduction *Volvox* is of much biological interest. Some of the colonies are asexual. In these a limited number of cells possess the power of dividing up into little clusters of cells; these clusters escape from the envelope of the parent colony and form new free-swimming colonies. In other colonies there are special reproductive cells, which may be called ova and spermatozoa cells.

Almost every young *Volvox*, when first discharged from the parent sac, already contains a certain number of enlarged zoids, destined in due time to become its own progeny; not only so, but long before its discharge, and while yet it exists as a daughter-cell within the cavity of the parent generation, these selected zoids are already visible as spots larger and darker than their fellows. As may probably be affirmed of all living organisms, its life-history would be incomplete without a process of sexual reproduction, and accordingly, after a long sequence of asexual generations, a strictly sexual process intervenes, from which result certain oospores destined to lie dormant for a while, to resist the vicissitudes of condition and climate, and to reproduce the parent form in the succeeding year, when external conditions again favour its development.

Interesting as the life-history of *Volvox* is, it is troubled with a parasitic rotifer nearly as interesting. When examining *Volvox* one occasionally finds a colony inside the sphere of which a small rotifer is seen swimming. In other *Volvoxes* may be seen two or three eggs of this rotifer, *Proales*, sp. It was my good fortune on two occasions to see this rotifer attacking and making his entrance into the *Volvox*. Swimming up to the *Volvox*, the rotifer fastened itself in some manner that could not be clearly seen with the objective I was using. Then the rotifer began to spin round rapidly on its longer axis, its head being close in the *Volvox*, and in a very short time it had cut or torn a small hole in the *Volvox*, through which it

squeezed itself, apparently with some difficulty. Once inside the colony it seemed quite contented, swimming freely in the cavity. When the eggs of this rotifer are observed inside *Volvox* it can be seen that development is proceeding. Often the young rotifer is seen moving in the egg, almost on the point of hatching.

—J. SEARLE.

BOTANY NOTES.

PLANT SOCIOLOGY.—Apart from that of Dr. Cockayne in New Zealand, very little systematic work has been done on this side of the world, and this by a few only, like Professor Osborn, of Adelaide, and Miss Collins and Mr. A. A. Hamilton, of Sydney, in the matter of the analysis and classification of our vegetation (gynecology or plant sociology). In the study of the relation between it and its environment (habitat), and the estimation of the various factors constituting the habitat (autecology or plant ecology), almost nothing has yet been attempted. So far, the work done here has been mainly taxonomic and floristic, resulting in the more or less complete determination of the distribution and range of some of our species. On the other side of the world, however, an ever-increasing attention is being devoted to these departments of the great subject of geobotany. Only comparatively recently has it been clearly recognized that vegetation is naturally and inevitably subject to change—to phases of progression or of degeneration—and that stability in it is arrived at only when it becomes in harmony with its surroundings and continues, perhaps, for a very long time, but only as long as all the factors of the habitat remain unchanged. Plant communities then tend to be definite expressions in vegetation of existing conditions, and, when developed to the greatest possible degree, are termed climax. As Tansly expresses it, plant communities, like human communities, "are quasi-organisms governed by natural laws," and, under the most favourable circumstances, may rise, as in the close exuberance of a tropical rain forest, to the very acme of all vegetation, or, under adverse conditions, decline to the seeming nothingness of a desert. As an instance of the manner of investigating vegetation, the methods of Braun-Blanquet and Pavillard, two exponents of what Tansly, in the *Journal of Ecology* of November, 1922, terms the new Zürich-Montpellier school, may be briefly referred to. Although there is still a great want of agreement in the terminology used by investigators and in the values given to the terms themselves, association seems now likely to be generally adopted as connoting a fundamental unit of vegetation. This association is a community of plants characterized by the

presence of one or more dominant species which are generally peculiar to it, and which give it a definite and easily-recognizable physiognomy. Parts of an association dominated by one or other of these are termed *consociations*, and minor but still definite groups of plants characterized by species other than the association dominants are termed *societies*. After a complete list of the plants in any particular association is made, the workers above-mentioned ascertain, by counting in small areas or by estimation in large, the degrees of *frequency*, *dominance*, and *distribution* of each species. Then their tendency to aggregate, or their *sociability*, their periodic changes giving rise to the different seasonal aspects or changes in the physiognomy of the association, and their degrees of *aggressiveness* or otherwise are measured. Comparison of similar types of vegetation reveals the amount of *constancy* of the species in these, and their *exclusiveness*, or the measure in which they are confined to them. *Life forms* are recognized, and Runkiaer's system can be used for the establishment of biological spectra, as was done for the first time in regard to Australian vegetation in the very interesting paper, "On the Ecology of the Ooldea District" (Trans. Roy. Soc. S.A., vol. xlvi., 1922), by Mr. R. S. Adamson and Professor Osborn.

A NEW BOTANICAL WORK.—Admirers of Dr. Cockayne and of the fine work he has done in the plant ecology of New Zealand will be much relieved to learn that the manuscript of his book, "The Vegetation of New Zealand," which was sent to Germany for publication some time before the war, has at last, in his own words, "after more vicissitudes than any book has ever experienced, made its appearance about a year ago." The volume, which contains 335 pages of text and 95 fine illustrations, mostly from the author's own photographs, forms the 14th section of "Die Vegetation der Erde," edited by Engler and Drue. The edition was quickly sold out, chiefly in Europe, and only 25 copies were available for New Zealand. Unfortunately, no copies appear to have been obtainable here. According to a review in the *New Zealand Journal of Science and Technology*, the author, after describing the physical features and climate of the islands, deals with the many plant associations of the sea coast, lowlands, high mountains, and the outlying islands in a most exhaustive manner. He then discusses the origin of the flora, the geographical distribution of its members and their relation to the plants of other countries, and finally gives a brief account of its geological history. It is much to be regretted that we are, so far, unable to make ourselves fully acquainted with what is described as an "epoch-making work."

The Victorian Naturalist.

VOL. XL.—No. 2.

JUNE 7, 1923.

No. 474.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 14th May, 1923.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about fifty members and visitors were present.

CORRESPONDENCE.

From Messrs. W. E. Briggs, R. H. Croll, and Dr. Heber Green, members of the Melbourne Amateur Walking Club, advocating the permanent reservation of an area in the parish of Glenaladale, county of Tanjil (Gippsland), adjacent to the Mitchell River, on account of the splendid specimens of various indigenous trees growing there, such as Pittosporum, Manuka, Lilly pilly, Myrsine, and Currajong, many of these being of exceptional dimensions, both in height, diameter of stem, and spread of branches. Twenty-seven species of birds were noted about the creeks intersecting the area, including the Lyre-bird, Wonga Pigeon, Bower-bird, and Black Cockatoo.*

After some discussion, in which several members took part, the letter was referred to the committee to take such action as was deemed necessary.

From Mr. A. Latham, secretary of the Victorian Society for the Protection of Animals, with reference to the export of live birds, and enclosing a copy of a letter received from the Comptroller of Customs on the same subject. The Comptroller said that "no promise had been given to the effect that any birds ordered prior to the issue of the recent proclamation will be allowed to be exported." In a following paragraph he said. —"The position is that, when an application is made to export birds, it will be approved in instances where it can be shown that the birds had actually been obtained by the exporter in fulfilment of an order received before the proclamation was issued."

Considerable discussion ensued, in which Messrs. A. E. Keep, J. A. Kershaw, C. Oke, and C. L. Barrett took part. Mr. Latham said that the official attitude seemed to be to let the export of birds go on. He said that he had been to the ships to see how the business is conducted, and found that the birds were sent away in ordinary packing cases, of which one side had been replaced by wire netting. Such cages were found to contain ten to twelve Cockatoos or thirty to forty medium-sized Parrots. He moved that a letter be sent to the Comptroller asking that a date be fixed on which export shall cease.

* For an interesting description of the "Enchanted Gorge" see the Argus (page 8) of 2nd June.—ED. *Vic. Nat.*

giving time for the dealers to dispose of their stocks, and also asking what societies or bodies would be represented on the proposed advisory committee.

The motion was seconded by Mr. A. E. Keep, and carried.

REPORTS.

A report of the excursion to Werribee Gorge on Monday, 23rd April (Eight Hours Day), was given by the leader, Mr. A. L. Scott, who reported a large attendance of members and an ideal day for the excursion. Owing to the continuous dry weather of the past three months the country was looking its worst, but, as compensation, the river was at its lowest, and thus excursionists were able to cross at places where at other times this was impossible. The geology of the Gorge was explained at several places, and the rugged scenery much admired by the visitors.

A report of the excursion to Healesville on Saturday, 28th April, was given by the leader, Mrs. E. Coleman, who said that there had been a good attendance of members and friends, who, however, had been disappointed in the objects of their search—orchids—for, the autumnal rains having failed to appear, the country was so dry that, with one exception, there were no signs of the plants they had gone so far to seek. The exception was the Autumn Orchid, *Eriochilus autumnalis*, of which a few flowers were found. A pair of leaves of *Chiloglottis diphylla* was the only other sign of orchids in a locality which is usually considered a good one for these plants. Under these circumstances it was decided to pay a visit to the new Maroondah dam in course of construction in connection with the water supply for Melbourne. Lunch was taken near the "Echo" tunnel, and in its neighbourhood a number of interesting birds, such as Blue Wrens, Fire-tailed Finches, Flame-breasted Robins, were noted. Later, Donnelly's Weir was visited, and its pretty surroundings of ferns and scrub much admired.

GENERAL BUSINESS.

Messrs. A. G. Hooke and F. Keep were duly elected to audit the Club accounts for 1922-23.

Nominations of office-bearers for 1923-24 were then made.

Mr. E. Cox referred to the absence of a safe crossing-place at the eastern end of the Werribee Gorge, and moved that a letter be written to the Tourist Committee, pointing out the necessity for some improvement in the present conditions. This was seconded by Mr. A. E. Keep, and carried unanimously.

PAPERS READ.

1. By Mr. Reginald Kelly, entitled "Thrips: an Unpopular Insect, treated Popularly."

The author gave some account of the life-history of the family and the results of his observations in Victoria, together with a list of the Australian species recorded to date. A number of species were exhibited as microscopic objects in illustration of the paper.

Remarks on the paper were made by Messrs. Pescott, Davey, and Oke.

2. By Mr. C. Hedley (communicated by Mr. C. Oke), entitled "On a Thalassoid Element in the Australian Molluscan Fauna."

The author called attention to the fact that the genus *Coxiella*, represented by a small shell found both in fresh and saline inland waters, and originally recorded from a salt lake near Mount Arapiles, Natimuk district, Victoria, is almost identical with the marine genus *Truncatella*, thus indicating a true thalassoid fauna. The shell in question, *Coxiella striatula*, has had so many changes of its name that he included a list of synonyms, with authorities, and urged further study of this interesting feature.

Messrs. Barrett, Oke, and Barnard referred to the presence of this shell near Melbourne, Mr. Oke stating that he had noted it at Elwood, while Mr. Barnard said that it is to be found on the shores of small lagoons near the Skeleton Creek at Laverton.

NATURAL HISTORY NOTE.

Mr. H. W. Davey, F.E.S., read some notes concerning a pair of Western Australian lizards, *Moloch horridus*, Gray, which he had in captivity for about six months.

EXHIBITS.

By Mr. F. G. A. Barnard.—Dried flowers of *Grevillea victoriae*, gathered near the Leviathan Rock, Buffalo Ranges, 14th April, 1923.

By Mr. C. Barrett, C.M.Z.S.—Stone axe (broken), found on sand-dune at Middle Brighton, Victoria.

By Miss R. Currie.—Foliage, flowers (unexpanded), and expanded "bolls" of the cotton plant, grown at Lake Boga, Victoria, 1923.

By Mr. H. W. Davey, F.E.S.—Photo. of male and female *Moloch horridus*, from Western Australia, and a stuffed specimen of the "Horned Toad" of California.

By Mr. C. Oke.—Spirit specimen of the Western Australian "Devil," *Moloch horridus*.

By Mr. R. Kelly.—Nineteen species of thrips as microscopic objects, in illustration of paper.

By Mr. A. E. Rodda.—Head of fresh-water Cat-fish, *Tandanus tandanus*, and preparation of shoulder girdle bones of

same, showing method of locking fine spines in the position of defence.

By Mr. J. Searle.—*Idolothrips spectrum* a giant member of the Thrips family.

By Mr. A. L. Scott.—Fossils from Oamaru, New Zealand, typical of the pebbles and gravel that form the Canterbury Plains in every respect except in size; tubes of sand from streams near Mount Cook Hermitage.

By Mr. L. Thorn.—A case of Orthopterous insects, including four species of leaf and stick insects, Phasmidae—two from Victoria and two from Queensland; four species of short-horned grasshoppers, Acrididae, three species of long-horned grasshoppers, Locustidae, including a fine specimen from Mount Bogong, collected by Mr. A. J. Tadgell.

After the usual conversation the meeting terminated.

ARTICLES by members have recently appeared in *The Emu* by Dr. MacGillivray entitled "Interesting Conduct of the Southern Stone-Plover, *Burhinus magnirostris*," and in the *Australian Museum Magazine* by Mr. C. L. Barrett, C.M.Z.S., entitled "Some Birds of Prey."

FORESTS AND WATER CONSERVATION.—A forcible article dealing with the question of re-afforestation, from the pen of Mr. E. G. Ritchie, Engineer of Water Supply, Melbourne and Metropolitan Board of Works, appears in the *Gum Tree* for March, 1923. Many will be surprised to learn that he considers the common bracken the greatest obstacle to re-afforestation that exists. Its vigorous rooting system overpowers the young seedling eucalypts, while its thick growth assists and helps forest fires. It is practically valueless, and, usually owing to fallen timber and stones, is quite unable to be cut by any machine in a practical way. He is strongly opposed to the removal of big timber from any land required for water supply purposes, because when such timber is removed its place is rapidly taken by bracken, which cannot be controlled in any way, and soon forms an impenetrable tangle. The Mountain Ash, *Eucalyptus regnans*, is particularly liable to destruction by fire in its sapling state, and requires all the protection that can be given to it. Mr. Ritchie's article should be placed in the hands of every person in authority concerned in water conservation, to be read and re-read and acted upon at every opportunity. The present drought is forcing the question of water supply home in many areas; let us therefore beware of handing over the elevated portions of our State to the grazier or the saw-miller.

NOTES ON THE COLEOPTERA OF NORTH-WESTERN VICTORIA.

PART IX.

BY J. C. GOUDIE.

(Read before the Field Naturalists' Club of Victoria, 12th March, 1923.)

WHEN dealing with the Scarabaeidae in these notes (*Vict. Nat.*, Dec., 1919, p. 119), the genus *Heteronyx* was purposely omitted pending the completion of a revision of the genus by Mr. A. M. Lea, F.E.S., entomologist of the South Australian Museum. By the courtesy of Mr. Lea I am now enabled to record all the species collected by me in the Mallee districts, as follows:—

Heteronyx auricomus, Blackb.
H. debilis, Blackb.
H. dimidiatus, Er.
H. insignis, Blackb.
H. jejunus, Blackb.
H. setifer, Blackb.
H. testaceus, Blackb.
H. xanthotrichus, Blackb.

The above are small, hairy, red or brown beetles which feed on eucalypt leaves, and are often seen flying about the tree-tops in numbers on summer evenings. During the day many of them may be found buried in the loose soil round the butts of trees.

ELATERIDÆ.

The beetles belonging to this family are a remarkably homogeneous group, not only from their uniformity in general appearance and sculpture, being narrow and elongate, but particularly from the presence of an ingenious spine and sheath process on the under side, which enables them to bounce upwards from any hard surface, and thus, no doubt, often escape from their enemies. Generally speaking, they are moderate-sized, dull-coloured beetles, nocturnal in habits, hiding by day under the bark of trees or under logs, stones, &c. On summer evenings they often fly indoors to the light, and bounce about on the table with a clicking noise. Since Candèze wrote his monograph on the family but little of a systematic nature has been published, so that probably many new species await description.

3072. *Lacon guttatus*, Cand.
3073. *L. humilis*, Er.
3077. *L. laticollis*, Cand.
3098. *L. variabilis*, Cand.

The species of *Lacon* are very common and widely distributed,

being found in large numbers under stones or logs on the "headlands" of cultivation paddocks. They are of obscure colours, and rather flattened in form.

3114. *Tetralobus australasiae*, Gory.

3118. *T. fortnumi*, Hope.

T. fortnumi is a fine species, measuring $1\frac{1}{4}$ inches; it is dark brown or black. The males have the antennæ strongly pectinate. *T. australasiae* is a similar but smaller beetle, and is more often met with.

3136. *Monocrepidius australasiae*, Boisd.

3144. *M. castaneipennis*, MacL.

3145. *M. cerdo*, Er.

M. commodus, Blackb.

3152. *M. fabrilis*, Er.

3160. *M. macer*, Cand.

3168. *M. plagiata*, Cand.

3177. *M. seniculus*, Cand.

The species of *Monocrepidius* are the slender brown or reddish "Clicks" which fly indoors to the light in thundery weather. Sixty-seven species are recorded by Masters.

• *Cardiophorus dursus*, Cand.

3219. *C. fulvostriatus*, Cand.

3224. *C. venustus*, Cand.

These are small beetles found under bark. *C. dursus* is shining black, with the basal half (nearly) of the elytra red. *C. venustus* has the prothorax pale red, the elytra dark, with two yellow spots on each.

3250. *Crepidomenus aeneus*, Cand.

3251. *C. australis*, Boisd.

C. aeneus is a slender, nearly black beetle, with a metallic gloss; it is three-quarters of an inch long. *C. australis* is smaller, also with a slight metallic sheen, which is rather an unusual feature in this family.

Eolus australis, Cand.

A small, dark brown species, with yellowish markings near the apex of elytra.

3281. *Anilicus semiflavus*, Gerin.

A fairly common insect. It is black, with about two-thirds of the basal area of elytra red or yellow, and measures three-eighths of an inch.

RHIPIDOCERIDÆ.

3315. *Rhipidocera mystacina*, Fab.

A rather handsome species about three-quarters of an inch

long. It is black, thickly spotted with white. The males have beautiful pectinated antennæ. It is often seen flying over new clearings or resting on fences.

332. *Psacus affagenoides*, Pasc.

At first sight this might easily be mistaken for one of the Dermestidae, or "skin-weevils." It is a quarter of an inch in length, dark brown, mottled with spots and patches of whitish pubescence. Specimens were taken at Sea Lake in flood waters.

DASCILLIDÆ.

Helodes victoria, Blackb.

This is an uncommon beetle. It is about the size and shape of *Psacus*, but is shining brown, with short yellow pubescence on the elytra. Taken on Golden Wattle, which grows freely in the Sea Lake district.

MALACODERMIDÆ.

The members of this family are known as "soft-skinned beetles"—that is, the elytra and other parts have not that horny or leathery texture common to most beetles, but are soft and fragile. In his comprehensive and valuable treatise on this group Mr. A. M. Lea remarks:—"The species almost entirely live on flowers or on leaves, and feed on nectar or on other insects; the larvae of but few species are known, but those of the Lycides live in rotting wood or underground."

Metriorrhynchus occidentalis, Blackb.

3356. *M. rhipidinus*, W. S. Macleay.

These beetles have the head, legs, and the small, strongly-ridged prothorax black, the deeply-furrowed, soft elytra red or yellow. *M. occidentalis* has a narrow black marking on the suture, not reaching base or apex of elytra. Both species (and several others of the genus) have a well-developed rostrum. The first-named measures one-half, and the latter five-eighths of an inch.

3383. *Telephorus nobilitatus*, Et.

A pretty blue and yellow species, under half an inch long; rather rare locally, but common nearer the coast.

Laius armicollis, Lea, Trans. Ent. Soc. London, 1909, p. 161, fig. 4.

3395. *L. bellulus*, Gér.

3399. *L. cinctus*, Redt. = *Mastersi*, MacL. = *semporalis*, Blackb.

* Trans. Ent. Soc. London, June, 1909.

L. distortus, Blackb., Tr. Roy. Soc. S.A., 1886, p. 264.
L. flavopictus, Lea (?), loc. cit., p. 166.
L. mirocerus, Lea, Tr. Roy. Soc. S.A., xli., 1917, p. 130,
 fig. 3.
L. nodicornis, Blackb., loc. cit., p. 264.
L. sculptus, Lea, Tr. Ent. Soc. London, p. 162.
L. villosus, Lea, P. L. S. N.S.W., 1898, p. 566.

The species of *Laius*, though small, are very attractive in appearance. They are of bright colours, usually red, with metallic blue, purple, or green bands on the elytra. They are numerous and widely distributed, being recorded from all the States. In the males the third joint of the antennæ is usually greatly enlarged, forming a distinct knob near the head in these otherwise filiform appendages. This character is of great importance in the identification of species, as in scientific descriptions of insects the male is always, when possible, taken as the type. *L. armicollis* is a rare species, distinguished from all others by a horn-like projection on the front margin of prothorax. *L. mirocerus* is likewise unique in the genus in having the antennæ strongly pectinate or comb-like. So far it has only been taken at Sea Lake.

3420. *Carphurus cervicalis*, Germ.

This beetle resembles some of the Staphylinidæ, the elytra being very short, about half the length of the abdomen. It also has the elongate, narrow form of those insects. It measures three-eighths of an inch, and is generally reddish, with green or blue elytra.

Helcogaster oxyloclodes, Lea, Tr. Roy. Soc. S.A., xiv., 1921, p. 123.

A small, shining black beetle, with yellow prothorax.

Dasytes fuscipennis, Hope, Tr. Ent. Soc. Lond., 1845, p. 105.

A widely-distributed species. It is dark brown, rather flat, and parallel-sided, clothed with long dark hair, and is about a quarter of an inch long. In his re-description of this insect Mr. Lea remarks:—"On the prosternum, between each coxae and the apical angle, is a large fovea, at the bottom of which is a roughly circular, flat space (this may be an enormously developed spiracle). There is nothing exactly like it on any other beetle known to me."

D. australis, Lea, var., Tr. Ent. Soc. Lond., 1909, p. 245.

This is a minute species, bronzy-black, and clothed with white pubescence. It sometimes occurs in thousands on wattle blossoms.

NOTES OF A NATURALIST IN NEW ZEALAND.

BY A. L. SCOTT.

(Read before the Field Naturalists' Club of Victoria, 12th Feb., 1923.)

It is hardly right that a member of this Club should visit New Zealand without trying in some way to pass on to his fellow-members some of the pleasure and profit of the trip. As my leaning is principally towards geology, you must pardon me if my remarks deal mainly with that branch of natural science. I have about fifty slides, which I hope will interest you, and possibly in some ways they will speak more eloquently than I can.

My trip lasted two months, during which time I was able to visit some of the most famous places of both the North and South Islands. Of the sea trip to Wellington there is little to relate except that it was very smooth until we reached Cook Strait, where, as the slide shows, we took some water on board.

Landing at Wellington (North Island) on the 6th March, 1922, I left twelve hours later by the fine ferry steamer *Wahine* for Lyttelton, the chief port of Canterbury (South Island), and thence proceeded to Christchurch and Timaru. This fast vessel, though a "ferry," is larger than many ocean-going liners. She has a good turn of speed and a fine record of war service as despatch vessel and mine-layer, as set out on a shield in a companion-way. Having set myself to cover the main portion of two islands in so limited a time, my impressions are necessarily based on limited experience, and cannot do full justice to the places visited. Christchurch, however, appealed to me most of all the cities I saw. Wellington, Auckland, and Dunedin are all fine places, each with its own attractions (I did not see Napier); but the fine streets, parks, and buildings of Christchurch, its water supply, its level site and extensive plain with mountains close at hand, and particularly the fine weather I experienced, have all combined to place Christchurch in a setting of its own among my recollections. From Christchurch rail was taken to Timaru, where a stay overnight was made, and thence inland by motor to Mount Cook—a trip of 130 miles, lasting from 8 a.m. to something after afternoon tea time. Mount Cook, New Zealand's highest peak, is 12,350 feet high, and words and pictures both alike fail to adequately convey the romance, the fascination, and the wonderful grandeur of the scenes in the neighbourhood. For two weeks I stayed at the Hermitage (really a fashionable, if isolated, hotel), and I could willingly have spent my whole time there.

In a talk of such a place an audience looks for something at least a little sensational. With the help of the guides visitors can obtain just as much, or as little, of sensational adventure

as is good for them. My own most thrilling episodes are not illustrated. Obviously, a decidedly nervous tourist, standing at 5.30 a.m. on the Great Tasman Glacier in ice-steps cut on a ridge between two crevasses, is not going to take a time photo. of the situation. Such a suggestion might even have caused the guide to develop a gift of speech like his axe—sparky and cutting. This glacier is said to be the biggest thing of its kind south of the line outside the Antarctic. The trips to it, graded carefully to meet the ability of the tourist, are deservedly "star" features among the many attractions of the Hermitage. The vast quantity of moraine, shown repeatedly in the slides, and the scarcity of striated pebbles, were striking to one whose sole previous experience of glacial action had been derived from an all too slender study of the Bacchus Marsh deposits, where striated pebbles are so much in evidence.

Very striking also to the visitor are the broad valleys between the towering mountain ranges: the swift-flowing, anastomosing streams; the size and number of the boulders moved, and the rapidity with which they are worn down, as judged by the distance carried from the place of origin. The rapidity of wear, however, may be more apparent than real, as a very slight change in the gradient of a stream has a great effect on the size of the débris forming its burden. It is of these and the West Coast streams that the saying goes that they are too kind to drown a man—they knock his brains out on a stone first.

Heights, distances, and levels are very deceptive. There is no horizon to give one a line of reference. The valleys are broad, and appear so level that it takes a little time to get accustomed to finding such swift streams in them. Likewise with heights and distances. The air is clear, and there is no standard of reference. From the Hermitage lawn one sees, about three miles away, Kea Point, which overlooks the Mueller Glacier. The return trip makes a pleasant morning's outing, but the usual estimate of the distance by visitors is half a mile, and some won't believe otherwise until they have gone half-way there.

As some people have an idea that every able-bodied, intelligent visitor to New Zealand climbs Mount Cook, I would emphasize that visitors to the Hermitage fall into two classes—tourists and high-climbers. The latter, like musicians, must be first born and afterwards made; and not every high-climber succeeds in making the ascent. It was towards evening on my first day at the Hermitage that I met the impressed tourist. He had, he stated, just returned from "the gates of hell." This was not the name of a topographical location, but a metaphorical description of part of the trip that he had just com-

pleted. "Only rocks and ice" someone may say, but I doubt if anyone, unless perhaps a native born and bred among them, can ever get really accustomed to the rivers of ice, the crevasses, and the towering snow-clad mountains, with their precipices, ridges, snow-fields, and gravel slides. To a newcomer, launched suddenly, unprepared, into the very midst of them, the effect must be little less than terrific.

It was my good fortune to make the Malte Brun Hut trip up the Great Tasman Glacier and to encounter a variety of conditions in the course thereof. I must explain the huts. These are the objectives of the tourists, the jumping-off places of the high-climbers. They are built in various places, some on easy tracks, the majority high on mountain sides. They consist, so far as I saw them, of two rooms opening into each other, and each opening directly to the outer world. Both are fitted with bunks. The smaller, in addition, being the ladies' room, has the washstand. The larger has the kerosene stove, the bookshelves, the mouse-proof lockers filled with blankets and food, the table, and all other luxuries. This is the living room and men's quarters. Other necessary provision is made. At the Ball Hut, for instance, is accommodation for horses. This hut is in the Great Tasman Valley, in a valley between the Wakefield spur and the lateral moraine of the glacier. To reach it is a pleasant thirteen-mile walk over gravelled valley and mountain-side tracks. This constitutes the first stage of the outward trip, and may be ridden if desired. At the hut we saw, as expected, one seagull and a solitary Paradise Duck, whose mournful call sounded the reverse of joyful.

Next day we proceeded a little further up this minor valley, over a couple of ridges of very rough moraine, and on to the ice of the glacier itself. That ice was not smooth. Imagine the sea on an average day. It is all waves and troughs. Freeze it suddenly, and you have some idea of the Great Tasman Glacier as I found it. There were flat areas in it, but the greater part of our journey up was among these frozen ridges—sometimes in their valleys, sometimes transversely. As the Malte Brun Hut is 2,500 feet higher than the Ball Hut, and ice, like water, only runs downhill, it will be understood that the ten-mile walk from hut to hut entails some work. Add to this the constant climbing of small ridges, too high to take comfortably in one step, only to have to descend them in the next step, and the constant watchfulness required to avoid slipping, and to escape stepping into the streams that so often, though not always, run along the troughs.

The surface of the ice was much honeycombed. In the bottom of each cell lay a grain of dirt. Occasionally a larger hole would be seen; in it would lie a pebble. The dark rock

absorbing the heat was thus gradually melting its way down; but where the dirt lies thick there is no melting, but a hill of ice beneath the rock which has acted as a shield against the sun. For, as the surface of a glacier is not smooth, neither is it, in general, clean, but covered with dirt and débris. Sometimes in great islands, sometimes in long strips, and sometimes the troughs between the waves were almost like garden walks, strewn with fine grit. On these the going was as good as on a footpath. The honeycombed ice was little worse. Occasionally slippery patches were met with; but at all times a look-out had to be kept for runaway holes, usually only an inch or so in diameter, but occasionally wide enough to take a man down into the cold depths. The water lying or flowing in the valleys was usually frozen over, and one quickly learned to tell instantly whether the surface would bear, break, or required testing.

The weather was so threatening that on one occasion we decided to change the programme for an easier trip; but a little later, fortunately, we again altered our minds and resumed the original programme. Arrived at the edge of the glacier at the foot of a steep bit that takes one up to the track to the Malte Brun Hut, a little Blondin work had to be done to get past the crevasses. There was only a little, and that little I did not relish. Arrived at the hut, we refreshed ourselves, and admired the view while enjoying a well-earned rest. At sundown the weather broke. We turned in early and listened to the thunder and the wind. The lightning was distant, but the thunder thundered none the less; and again, as a giant roll seemed to challenge all the world to a roaring match, the wind would come with a whoop that would completely drown the thunder, while the hut seemed to strain against its moorings. And so it went on all through the Saturday night. Said an old hand later, "Yes, it can blow some at Malte Brun." And indeed that remark seems to apply to the whole valley and some, at least, of the tributary valleys. A curious thing about the gusts, more noticeable at night, was that just before the loudest came there would often be a lull, then a slight noise that could almost be described as a "click," then presto! whoop! down came the gust. With the morning the weather moderated, but, as the wind still came up in sharp squalls, it was not possible to start homeward that day. From time to time one would look out at the door and say, "It looks like clearing," then hastily bang the door to keep out the driving rain. After much consultation of the barometer a start was made at five on Monday morning.

The rain had polished the ice, the storm had made it move, the crevasses had opened out. For the first part of our return journey it was only possible for the tourist to keep his feet in

the troughs, where there was nowhere to slip to, or in hollows on the broader ridges in which powdered snow lay. The crevasses had greatly extended—sometimes on one side, sometimes on both sides; they sloped away like great conchoidal fractures into the icy green depths. I did not ever see down any very great depth; the things just steeply sloped and curved away out of sight under overhanging ice. After studying them for a little, as occasion offered, I came to the decision to give undivided attention to the steps that the guide had to cut on the glassy ridges. A crevasse on one side is not so bad—you always have a chance, if an accident should happen, to fall to the other side; but a crevasse on each side is "over the gate," as the saying goes. Keeping my eye very strictly on the business in hand, it presently came as a pleasant shock to find that the last crevasses had petered out, and that we were among the old familiar "frozen waves"—no longer with the honey-combed surface of Saturday, but slippery as glass, so that, watching every step, we kept as much as possible to the long valleys. Changing to another valley meant step-cutting or else a bodily rolling over the polished ridge. To finish briefly, thanks to the altered conditions, our return journey to the Ball Hut (ten miles) took eight strenuous hours—thrice as long as would have been ordinarily expected; but the guide, in spite of loaded rucksac and other responsibilities, turned never a hair. After lunch and a rest at the Ball Hut we did the remaining thirteen miles to the Hermitage comfortably in under four hours. I would not have missed that trip for a lot; but that Monday night, and for a little after, I did not want any more glaciers at present, thank you.

Another interesting trip made a few days later was that up the Mueller glacier to the Mueller Hut *via* the Green Rock. I have not, however, any slides relating to it. We returned over the ridge of the mountains. Leaving the hut, we climbed up the mountain side into a snow storm, over the ridge, and then, after a short clear space, descended into a rain storm, and arrived home thoroughly drenched. You take the weather as you find it over there, and healthy people observing ordinary precautions are apparently none the worse for it—rather the contrary, for the tradition is that almost everyone dies of old age.

Here are some slides illustrative of the country round Queenstown and Glenorchy, both on Lake Wakatipu. The Scott Memorial in Queenstown Park is most appropriate. A great boulder, borne from afar by long dead glaciers, now rests near the strange lake. On one side tablets have been fixed bearing record to the high achievement and cheerful suffering displayed in the carrying out of a noble adventure. Though not included

in the itinerary, I also show some slides of Milford Sound to round off the subject.

From Queenstown to Dunedin, city of Scotchmen, thence to Oamaru, noted for stone and the streets named after English rivers—Eden, Thames, Severn, and so on. Like so many of the New Zealand towns, Oamaru is a city of fine churches, usually well filled on Sundays. Idyllic green hills surround it. The railway line runs along the seashore, so that in heavy weather the spray must surely dash against the passing trains. Thence to Christchurch once more and across the island to Greymouth *via* Otira Gorge. The railway through was soon to be finished, but then (and perhaps still) a portion of the journey must be made by coach. It is to be hoped that, for the sake of the tourist, the railway time-tables will be so arranged that those desiring it may always be able to take the coach through the famous Gorge. Of Greymouth I have at present no slides available, though there are some striking photos on the table. Like the rest of the fair West Coast, it is a place of heavy rainfall. There also is a notorious bar, reputed to be the worst in the South Island and the second worst in the Dominion. The swift river meets the rollers of the ocean, and their mutual strife raises an ever-shifting bar. A northward current hurries along the coast. The vessel that gets out of hand while going through the narrow entrance is almost certainly doomed. Usually she piles up on the north mole, where some of the plates of the last victim, the *Perth*, were still visible at the time of my visit.

Thence I went by train and motor to Westport through the famous Buller Gorge, of which, and the current-driven ferry across that river, I have here some views. Thence by motor to Nelson through picturesque country of which I have no slides. Crossing Cook Strait by a small ferry to Wellington, I went next to the Thames, an important mining and farming locality, famous in bygone times for its stupendous gold production—noted also for the apparent uniformity, to the eye, of its rocks, which, under the microscope, show very great diversity. A feature of New Zealand is the large amount of wood construction, which necessitates corresponding precautions against fires. Iron fire-escapes outside the buildings and directions inside to the nearest exit are the regular thing. In Thames they go one better. The fire bells are in the streets, and a slide is here shown of the largest.

The itinerary took me next to Rotorua, the centre of the hot-lake district, where the weather was on the damp side. At Rotorua, which is a most interesting place, I spent about a week. Excellent motor services cater for the tourist traffic to all the notable places. About two miles out of the town is

Whakarewunewa, commonly called "Whokka." At the end of the town itself, but on the other side of it, is Ohinemutu. Of part of "Whokka" I show a slide. It is a decidedly picturesque place, with hill and valley and scrub. It is, however, no place to move about in on a dark night; the Maoris themselves avoid that, for hot springs and geysers lie in wait everywhere. They appear to be cooling, though one can never be sure that an apparent cooling is not merely due to a blocking of the "pipes," so to speak, which may lead to trouble elsewhere. An interesting feature at "Whokka" (and also Ohinemutu) is that the villagers' domestic operations are all carried on by natural heat. One spring is kept for boiling potatoes, another for scalding pigs, another for laundry, others for bathing, and so on. By the side of a path is a pedestal with an urn on top, naturally formed. This, says the guide, is the pot where a famous chief boiled the brains of an equally famous rival whom he conquered. The hot spring that did the work has since ceased, and the "pot" has been cold for many a year. Two or three slides show features about the notorious Fryingpan Flat, and the series closes with one of a trout fisher at work (or play?). Nearly all the pleasure-seekers of the Dominion seem to be disciples of Izaak Walton.

In conclusion, I would say that to my mind New Zealand is a *beau ideal* of a holiday resort. It is not one country, but a dozen. For myself, I felt most of the time, but particularly while in the Mount Cook country, like a child at its first pantomime—dazed and enchanted with wonder and delight.

As some of you may at some time contemplate a visit to New Zealand, it may be worth while saying a word or two regarding the literature available useful to a naturalist. There is in New Zealand a voluminous literature of New Zealand travel. The trouble, however, is to find the precise information one requires about the particular place one is for the moment interested in. There is a good collection of well-selected books—perhaps two or three hundred—at the Mount Cook Hermitage, but elsewhere I quickly found that my best plan was to visit the local library at first opportunity and get the Geological Bulletin dealing with the district—not for the sake of the geology (which, though always glanced at, often received very scant attention), but for the sake of the reliable authentic information as to history, industry, &c., usually to be found therein—information that otherwise it would have been practically impossible to obtain. These Bulletins have not yet been issued for all places, but there are a considerable number available. The system, however, broke down at two places where I rather felt it. At Queenstown, on Lake Wakatipu, the librarian, with sympathetic disgust, informed me that there was nothing of that

sort on his shelves. It was only on my trip down the lake, *en route* to Dunedin, that, through the kindness of the master of the vessel, I first saw the Bulletin for the district—a most interesting compilation, dealing largely with glacial action. Had a copy of it been in the library, at least one of my days in the town would have been spent to better advantage. The other place was Rotorua. The attendant there was quite cheerful over the total absence from their library of anything in the nature of books dealing with the locality, yet every shop, almost, had popular pamphlets about the wonders of the district. Lest we ourselves be unduly high-minded, I will further add that I once asked in Maryborough (Vic.) library if they had any publications dealing with the district, more particularly the geology. I was told they had nothing of the sort, "but Mr. So-and-So at the High School is interested in those things, and the mining registrar has plans." I did not pursue the matter further. In refreshing contrast was the attitude of the attendant in the Dunedin library who, without a word, by her manner conveyed the idea that geology was the one thing in a library that could or should really interest anyone. Marshall's Geology and Park's Geology were both most useful, and books by surveyors and pioneers, such as Harper's "Pioneer Work in the Alps of New Zealand," were always worth reading when one had time. Miss Du Faur's book also, though only mountaineering, should be read both before and after a visit to the Mount Cook Hermitage.

BIRD NOTES.

THE REGENT PARROT.—Some of the trivial names for Parrots adopted by the Check-list Committee of the Royal Australasian Ornithologists' Union are more pleasing than the old ones. The "Smoker" or "Rock Pebbler," *Polytelis anthopeplus*, has been rechristened Regent Parrot, and the name is well deserved. No one who has seen these splendid birds in their haunts, flying with sunshine gleaming upon their plumage, will gainsay their right to a more dignified title than "Smoker." Indeed, they are so beautiful that in shadow even their yellow and olive plumage has a dim magnificence. Sunlight transforms them into golden birds.

Regent Parrots are becoming rare, and now, in Victoria, are wisely protected. Their headquarters during the breeding season, in our State, are at Whyperfield, the Mallee National Park, where I have seen them at their best. Early in November the nest hollows in gnarled old River Gums, *Eucalyptus rostrata*, Schl., contained fledglings, some nearly ready to fly. Many of the hollows were empty. Bird-trappers had been

raiding the district, and their trail was marked by desolate homes of Parrots and Cockatoos. "Smokers" have long been regarded as "fair game"—not to be killed, but to be taken into captivity. They are excellent whistlers, learn to talk rather well, and are most engaging in their ways. But the toll has been too heavy, and now it is certain that, without strict protection, the Regent Parrot will become one of the rarest birds in Victoria.

At a Mallee homestead I made the acquaintance of a "Smoker," pent in a packing-case cage. He had been a pet for years, but was no lover of strangers. My friendly advances were met with snapping beak and notes that betokened both anger and scorn. Often, listening unseen, I enjoyed this unsociable Parrot's contented monologue. He had a charming habit of conversing softly with himself—no distinct notes, no mimicked human utterance, but a ripple of joyous and musical sounds. Instantly, when I came from cover, the Parrot became aggressive, and scolded me for spoiling his tranquil gossip with himself.

TALKING COCKATOOS.—Which species of Cockatoo is the best "talker"? Lately I heard a fine specimen of the Western Long-billed Cockatoo, *Licmetis pastinator*, "laugh" and "cry" and "talk" so humanly that I am inclined to advance the claims of the species to the championship. "Tom" belongs to Mr. Young, of Christmas Hills (Vic.). He was brought from Western Australia some years ago, and has long been famed in the hills district. He dances to his own accompaniment, "Lull-a, lull-a-ja," utters merry "Ha! ha! has!" when bidden to laugh, and makes a sound not unlike crying when pretending to be sad. His repertoire includes the usual phrases that pet Cockatoos are taught to repeat, and others more original. His enunciation is excellent; he does not slur the words as some talking birds are apt to do. "Tom" is a favourite with children, and nothing pleases him more than to "show off" with a ring of smiling faces around his cage. His speech is "almost human," and many of his actions display intelligence.

—CHARLES BARRETT.

THE GANG-GANG COCKATOO.—In a huge white gum near the edge of the Orbost road, between Colquhoun and Nowa Nowa, a pair of Gang-Gang Cockatoos, *Callocephalum galactatum*, selected their home. During early October, 1921, the birds were lurking about the tree, and apparently cleaning the hollow for nesting purposes. It was not till nearly two months later that the female commenced to lay. The birds were quite safe

from being robbed, as the nesting hollow was over 80 feet from the ground in a tree whose trunk was free of branches to a height of 40 feet. It is not remarkable that the nest of the Gang-Gang is so rarely found, especially when so few people are familiar with its shy habits. Shortly after sunrise the male bird would be heard screeching in the nesting tree, and would then disappear for the rest of the day. Towards evening it would reappear and again utter a few screeches. Although the country was unselected—almost in a virgin state—yet this was the only pair seen during a week's sojourn over an extensive area of that locality. However, in the western portion of Gippsland, about Neerim, it is at times quite plentiful. Several small flocks, comprising from five to eight birds, is a daily sight in the heavily-timbered country. Several years ago a pair was observed feeding in the hawthorn hedges near Buln Buln, where they remained till well into winter, until the berries were done. Each succeeding year brought more Gang-Gangs to devour the berries, and finally the autumn congregation numbered no less than forty birds. They were noisy feeders, as they used to crush the stone inside the berry, and their whole attention appeared to be concentrated on picking and eating the berries. When thus engaged it would be possible to approach within a few yards of them. Invariably a sentry would be perched on an elevated position, keeping watch, but it lacked the vigilance of White Cockatoos' sentries. Though Eastern Victoria is the stronghold of Gang-Gangs, and they are familiar to all settlers, yet very few Gippslanders know it by its proper name.—D. DICKISON, East St. Kilda.

MICROSCOPICAL STUDY IN THE HOME.

ANGUILLULA.

If a small drop of the cloudy sediment left in the vinegar cruet is placed under a low power of the microscope, it will be found to be teeming with transparent, thread-like worms, the so-called "vinegar eel," *Anguillula acetii*, belonging to the widespread and destructive group of Nematode worms. The wriggling mass under the microscope comprises individuals of all sizes, from that of the newly-hatched worm up to a fully-grown specimen measuring, perhaps, one and a half to two millimetres. They are about thirty times as long as broad, and are widest about the middle, tapering slightly towards both ends. The head is blunt, rounded, with a circular mouth, while the tail tapers off to a sharp point. The oesophagus generally has a constriction, giving it a bilobed appearance. The ovary is a simple tube, and the ova are very large.

Closely allied to the vinegar eel is the "paste worm," *A. glulinus*, that develops in vast numbers in paste that is turning sour. They are smaller than the vinegar eel, and not so lively in their motion. A still smaller species, *A. fluvialis*, is found amongst *Spirogyra*, &c., in pond water.

Some of these worms are very tenacious of life. It is said, though I have never verified the statement, that they can be thoroughly dried, and remain so for long periods, when, if they are again placed in water, they swell out and again function as living animals, eating and reproducing. It is recorded of an allied species, *Tylenchus tritici*, which causes the disease known as "ear-cockles" in wheat, producing galls that take the place of the grains of corn, that they can survive in dryness for twenty years. If one of these blackened grains be divided, the interior will be found to contain a white cottony mass, like bundles of fine fibres closely packed together. If a portion of this is put on a glass slip with a drop of water under a cover glass, in a very short time it will be found to be a wriggling mass of life, the apparent fibres being really *Anguillulae*. Other species live in the soil and attack root crops, such as onions and potatoes, doing great damage and causing great loss to the growers.

Cobb, an able naturalist, more appreciated in U.S.A. than he was here, when in Australia described over eighty species of these Nematodes, more than half of which were new. There is a large field here for the practical worker; will some of our younger members take it up?

MOULDS (MUCOR).

When the housewife opens a pot of her home-made jam and finds it covered with mould she is rather annoyed at the discovery; but had she taken the precaution to thoroughly sterilize the jam pots by boiling them for thirty minutes or so immediately before using, and hermetically sealing them as soon as filled with the hot jam, the minute air-borne spores of the mould could not have gained access, and her preserves would have remained sweet and wholesome.

These despised moulds are very interesting objects to the microscopist, and may be obtained for study any time by soaking a slice of stale bread in water and covering it with a bell-glass to prevent evaporation. After three or four days a white, flocculent mould will be seen on the bread. Upon examination it will be found to consist of long unbranched stalks (hyphae), which ramify the substance of the bread, from these thinner branches are produced, which re-branch until it has the flocculent appearance just mentioned. Soon portions of the hyphae grow erect in the air, and the tips swell into tiny

knobs (sporangium), glistening white at first, but gradually darkening into a mass of sooty spores. If we place some of these spores in a drop of sterilized fruit juice in a moist chamber under the microscope, we can watch them swell and germinate and finally produce the branched mycelium from which new sporangia will develop. If we are *very* fortunate we may observe the formation of a zygospore, a black body large enough to be seen by the naked eye, which is another means *Mucor* has of reproducing itself.

Other moulds that may be grown on bread are *Aspergillus*, which forms strings of spores, and *Penicillium*, with a number of strings of spores attached to the tips of the branches. They may thus be identified.—J. SEARLE.

"THE AUSTRALIAN MUSEUM MAGAZINE" for April, 1923 (vol. i., No. 8), is to hand, with a nice selection of well-illustrated articles which are not too technical for the ordinary reader. In fact, every real naturalist should become a subscriber to this magazine, which is well printed and produced. The subscription, one shilling per part (four yearly), with one penny each for postage, should be forwarded to Messrs. Angus and Robertson, Castlereagh-street, Sydney.

FORESTRY.—The Victorian Forests Commission is sending out specimen copies of the *Australian Forestry Journal* for March, 1923 (vol. vi., No. 3), with a circular asking for the support of tree-lovers both as subscribers and contributors. We trust that some of the members of the Field Naturalists' Club will give it what help they can. The journal is published in Sydney under the direction of the Forestry Commissioners of New South Wales. The subscription is four shillings per annum. Editor's address, 25 O'Connell-street, Sydney, N.S.W.

RING-TAILED PHALANGER.—During a brass band recital in the Maldon shire hall reserve recently, about 8 p.m., a small phalanger, probably the Ring-tailed species, was seen advancing slowly and carefully in a sitting posture along a telephone wire, until it reached a position almost immediately above the band stand, where it remained calmly seated for fully a quarter of an hour, apparently enjoying the music. The reserve is full of trees and shrubs, but the wire was evidently selected as being the most convenient both for approach and retreat. It was not a tamed animal, but one of several which live unmolested in a wild state about the precincts. When the music ceased the little acrobat retired complacently by the way it had come.—J. C. GOURIE. Maldon, 9/3/23.

CORRECTION.—In May *Naturalist*, page 15, line 13, for "gynecology" read "synecology."

The Victorian Naturalist.

VOL. XL.—No. 3.

JULY 5, 1923.

No. 475.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE forty-third annual meeting of the Club was held at the Royal Society's Hall on Monday evening, 11th June, 1923.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about sixty members and visitors were present.

REPORT.

A report of the excursion to Green Gully, Keilor, was given by the leader, Miss I. Crespin, who said there had been a good attendance of members, and an interesting afternoon had been spent in studying the geological features of the district, a number of interesting specimens of fossils, &c., being obtained.

ANNUAL REPORT.

The hon. secretary, Mr. C. Oke, read the forty-third annual report for the year 1922-23, which was as follows:—

"TO THE MEMBERS OF THE FIELD NATURALISTS' CLUB OF VICTORIA.

"LADIES AND GENTLEMEN.—In presenting the forty-third annual report of the Club for the year ended 30th April, 1923, your committee desires to thank members for their hearty support during the past twelve months, and to congratulate them on the continued success of the Club.

"Commencing the year with 282 members and associates on the roll, there were elected 28 ordinary, 8 country, and 3 associate members. Deaths numbered 6 and resignations 12, leaving a membership of 303, showing an increase of 21 for the year.

"It is with deepest regret we have to record the death of several well-known members of the Club. In July Mrs. J. Simson and Mr. W. Stickland passed away. In August there occurred the death of Mr. F. Spry, entomologist to the National Museum, who had been a member for over forty years. In October Mr. A. Borthwick died. In November another member of forty years' standing, Mr. J. Gabriel, passed away; he was one of the Club's most energetic workers, especially in connection with the wild-flower exhibitions, when he always rendered most valuable services. Finally, in December, Mr. J. R. Tovey, assistant at the National Herbarium, died. Reference to each of these was made in the *Naturalist* at the time, and the committee desires to place on record the very great loss the Club has sustained by the death of these members.

" The monthly meetings have been held regularly, and both the scientific and popular sides of the Club's work have been, as usual, well maintained. There has been an average attendance of about 60 members at the meetings, and the papers, with the discussions that have followed their reading, have been interesting and instructive. The following papers and lectures have been delivered:—May—'Introduction and Spread of Noxious Weeds,' by Mr. H. W. Davey, F.E.S.; June—'Presidential address, 'Twixt Bass Strait and Southern Ocean,' by Mr. F. Chapman, A.L.S.; July—'A Simple Study of Our Common Serpula,' by Mr. P. C. Morrison; August—'A Circuit of the Grampians,' by Mr. J. W. Audas, F.L.S.; September—'Some Autumn Orchids,' by Mrs. E. Coleman, and 'An Entomologist in the Dandenongs in Winter,' by Mr. C. Oke; October—continuation of Mr. Oke's paper; November—'A Trip to the North and North-West from Broken Hill,' by Dr. Macgillivray; December—(1) 'Notes on the Measurement of Tall Trees,' by Mr. A. D. Hardy, (2) 'Common Salt: its Manufacture and Relation to Animal Life,' by Dr. MacCallum; January—'On a Cast of a Sea Urchin from the Red Sands of Studley Park, Kew,' by Mr. F. Chapman, A.L.S., and holiday experiences by members; February—(1) 'Notes of a Naturalist in New Zealand,' by Mr. A. L. Scott, (2) 'Notes on the Victorian Chlamydopsini (Coleoptera), with Descriptions of New Species,' by Mr. C. Oke; March—(1) 'On Concretionary Limestones in General, and on Pebbles from Lake Omeo in Particular,' by Mr. F. Chapman, A.L.S., (2) 'Notes on the Coleoptera of North-Western Victoria, Part IX.,' by Mr. J. C. Goudie, (3) 'Our Alpine Flowers,' by Mr. H. B. Williamson, F.L.S.; April—(1) 'Notes on the Protozoa of the Melbourne District,' by Mr. J. Stickland, (2) 'On a New Species of Marine Bivalve Shell, *Hemidonax Chapmani*,' by Messrs. Gatliff and Gabriel. The papers may be summarized as follows:—Zoology, 3; entomology, 3; botany, 4; geology, 3; palaeontology, 1; general, 3.

" The committee during the year decided to purchase a lantern, and it is now available for the use of members who may wish to exhibit slides of interest at the Club meetings. The committee hope that members will bring forward suitable slides and exhibit them for the benefit of fellow-members.

" The excursions are still as popular as ever, and form one of the most important branches of the Club's activities. Twenty-eight excursions were held during the year, fourteen being to places near the metropolis on Saturday afternoons. Whole-day excursions have been held to Evelyn, Belgrave, Langwarrin, You Yangs, Yarra Junction, Pakenham, Nar-Nar-Goon, Upwey, Werribee Gorge, and Healesville, while more extended trips

have been made to Bendigo, Natya, and Torquay. Unfortunately, both the Christmas and Easter trips were cancelled, as it was impossible to obtain accommodation on short notice.

"In June the Club held an exhibition of natural history specimens in the Athenaeum Hall. This was opened by Sir Baldwin Spencer, K.C.M.G., and proved very interesting, but, through our inability to obtain the Town Hall, was not a great financial success. However, it resulted in £3 2s. being added to the finances of the Club, after donating £7 7s. (from the sale of flowers) to the Children's Hospital.

"The annual exhibition of wild-flowers was held in the Town Hall on Tuesday, 3rd October, and was opened by Sir Robert Best. It was a great success, though the usual quantities of flowers were not received, due, no doubt, to the dry season. To all those who helped to make this event so successful the committee desires to record its very best thanks, and more particularly to the ladies' committee, which rendered such splendid service. A sum of £149 3s. 1d. was cleared, of which £76 was donated to the Children's Hospital. A letter of thanks was received from the hospital committee, and inviting this Club to nominate three life-governors. By a vote of the Club, Messrs. Daley, Barnard, and Pitcher were nominated, and duly made life-governors of the hospital.

"Your committee has given considerable attention to the subject of prohibiting the export of our native birds and mammals and the introduction of foreign birds, and was represented on deputations dealing with these subjects to the Minister of Trade and Customs and to the State Chief Secretary. From assurances received it is hoped that the export of our native birds will soon cease. It has also had under consideration the reservation of further areas for the preservation of our native fauna and flora.

"The hon. secretary of the Plant Names sub-committee reports that its work is practically completed, inasmuch as the census of Victorian plants, with their vernacular names and brief details as to their distribution, is now in the hands of the printers, and should be ready for issue at an early date.

"At the February meeting of the Club, eight members elected in May, 1880, and who still belong to it—namely, Messrs. Balf, Barnard, Best, Dixon, French, Pitcher, Sloane, and Wisewould—were elected honorary life-members in recognition of their continuous membership and their valued services during that long period.

"The thirty-ninth volume of the *Victorian Naturalist* has been completed, and once again your committee desires to place on record its great appreciation of the untiring devotion of the honorary editor to producing the Club's journal. The

demand for the journal overseas is still very great, and may be taken as an indication of the interest in Australian natural history. Your committee has decided that the time is ripe for an effort to permanently enlarge the *Naturalist* both as regards letterpress and illustrations. This, of course, will add considerably to the printing account.

" The hon. librarian reports that during the year numerous valuable donations have been received, and several volumes dealing with Australian natural history in its various aspects have been added to the library.

" Your committee regret that two of its members have intimated that they do not desire re-election owing to pressure of other engagements—Mr. F. Pitcher, who has been hon. treasurer since 1919, and looked after the accounts so carefully, and Mr. P. R. H. St. John, who has had charge of the library since 1915, and who has spent many an hour looking after the books in his care. To both officers the committee tender their very best thanks for the services rendered, and would like to express the wish that the Club have the pleasure of having them again as office-bearers at no distant date.

" The hon. treasurer reports that the ordinary receipts for the year amounted to £200 14s. 3d., and the expenditure to £231 18s. 5d., showing a debit balance of £31 4s. 2d., but this has been met by the balance from last year. Arrears of subscriptions considered good should make up this deficiency. The intended increase in the size of the *Naturalist* will, however, quickly absorb a large portion of this balance.

" The attendances at committee meetings have been as follows:—Messrs. Oke, 13; Barnard, 12; Sutton, 12; Williamson, 12; Daley, 11; Pitcher, 11; Tadgell, 10; Chapman, 9; St. John, 8; Barrett, 7; Scarle, 6; Pescott, 4.

" In conclusion, your committee desire to express their gratification at the way their efforts to uphold the work of the Club, and to further its aims, have been supported by all members, and hope that this support will be extended to the incoming committee.

" On behalf of the committee,

" CHAS. DALEY, President.
" CHARLES OKE, Hon. Sec.

" Melbourne, 11th June, 1923."

On the motion of the chairman, seconded by Mr. E. E. Pescott, F.L.S., the report was received and adopted.

FINANCIAL STATEMENT.

The hon. treasurer (Mr. F. Pitcher) read the financial statement for 1922-3, which was as follows:—

July, 1923]

Field Naturalists' Club—Proceedings.

41

RECEIPTS.

To Balance, 30th April, 1922	..	..	..	..	..	£44 4 11
Subscriptions—						
Ordinary Members	..	..	£133	4	6	
Country Members	..	..	23	10	0	
Associate Members	..	..	2	12	6	
						£159 7 0*
Victorian Naturalist—						
Subscriptions	..	..	5	1	9	
Sales	..	..	2	0	6	
Advertisements	..	..	9	5	0	
Reprints	..	..	3	4	7	
						19 11 10
Sales of Badges	..	..	0	17	6	
Donations—						
Publishing Fund	..	..	8	17	0	
Interest—Savings Bank and War Loan	..	..	12	0	11	
						200 14 3
Fares, Char-a-banc Excursion, Warrandyte, August, 1922	..	..				10 18 0
June Exhibition—						
Admissions	..	..	..	23	5	0
Sales of Flowers	..	..	..	7	15	3
Donation	..	..	..	0	5	0
						37 5 3
Wild-flower Exhibition—						
Admissions	..	..	..	140	17	0
Sales of Flowers	..	..	..	62	15	11
Refreshments (profit)	..	..	..	14	0	0
Donation	..	..	..	0	14	0
						218 6 11
						£505 9 4

* Subscriptions:—Arrears, £19; 1922-3, £135 19s. 6d.; advance, £4 7s. 6d.—total, £159 7s.

EXPENDITURE.

By Victorian Naturalist—						
Printing	..	..	£141	19	2	
Illustrating	..	..	13	7	4	
Free Reprints	..	..	7	17	9	
Reprints Charged	..	..	0	16	3	
						£164 0 6
Victorian Naturalist—						
Wrapping and Posting	..	..	..	20	9	0
Rooms—Rent and Attendance	..	..	..	13	17	6
Library—						
Periodicals and Books	..	..	£6	9	11	
Insurance	..	..	0	7	0	
						6 16 11
Hire of Lantern	..	..	..	1	14	0
Printing	..	..	..	6	9	0
Postages, &c.	..	..	..	7	6	6
Purchase of Lantern, &c.	..	..	..	9	3	0
Donation—Native Fauna Poster	..	..	2	2	0	
						£231 18 5
Carried forward	..	..	..	£231	18	5

Brought forward	..	..	..	..	..	..	£231 18 5
By June Exhibition—							
Athenæum Hall and Attendance	..	..	10	11	0		
Printing and Advertising	..	..	3	5	0		
Purchase of Flowers and Plants	..	..	1	0	0		
Cartage, &c.	..	..	3	18	3		
Donation—Children's Hospital	..	..	7	7	0		
						26	1 3
.. Wild-flower Exhibition—							
Town Hall and Attendance	..	..	39	15	4		
Printing and Advertising	..	..	8	5	6		
Cartage, &c.	..	..	6	3	2		
Purchase of Flowers and Plants	..	..	14	19	10		
Donation—Children's Hospital	..	..	76	0	0		
						145	3 10
.. Melbourne Town Hall—Deposit Wild-flower Ex- hibition, 1923	..	..				18	0 0
.. Char-a-banc Excursion, Warrandyte, August, 1922	..	..				14	5 0
.. Balance in Savings Bank	..	..	50	0	0	435	8 6
.. Balance in London Bank	..	..	20	0	10		
						70	0 10
							£505 9 4

F. PITCHER, Hon. Treasurer.

30th May, 1923.

Audited and found correct.

A. E. KEEP,
A. G. HOOKE, } Auditors.

6th June, 1923.

The following statement of assets and liabilities was also read:—

ASSETS.

Balance Savings Bank and London Bank	..	..	£70	0	10
War Loan Bond	..	..	20	0	0
Arrears of Subscriptions (£50), say	..	..	25	0	0
Deposit (1922-3) in Savings Bank	..	..	175	0	0
Badges on hand	..	..	0	17	6
Deposit in Savings Bank for Plant Names Publica- tion	..	..	150	0	0
Library and Furniture (Insurance Value)	..	..	150	0	0
			£590	18	4

LIABILITIES.

Subscriptions paid in advance	..	..	£4	7	6
Char-a-banc Fund	..	..	£10	0	0
Less Warrandyte Excursion	..	..	3	7	0
Deposit for Plant Names Publication	..	..	150	0	0
			£161	0	6

On the motion of the chairman, seconded by Mr. E. E. Pescott, F.L.S., the statements were received and adopted.

The hon. treasurer read a further statement showing the credit balances of the wild-flower exhibitions, 1916-22, and the objects to which they were devoted, being as follows:—

1916—Town Hall ..	£131 6s. 10d.	Y.M.C.A. Soldiers' Work.
1917— ..	£212 5s.	10d. Ditto.
1918— ..	£141 2s.	9d. Ditto.
1919— ..	£167 3s.	5d., half to Anzac House Fund, half to Plant Names Publication Fund.
1920— ..	£107 13s.	6d., Plant Names Fund. (Upper Hall)
1921—Athenaeum ..	£150 6s.	7d., Club Funds.
1922—Town Hall ..	£149 3s.	1d., £76 to Children's Hospital, £73 3s. 1d. to £1,059 1s. 3d. Club Funds.

This record, he thought, would be interesting to country members, who were somewhat at a disadvantage regarding the Club's activities.

ELECTION OF OFFICE-BEARERS.

There being only the requisite number of nominations, the following office-bearers were declared duly elected:—President, Mr. C. Daley, B.A., F.L.S.; vice-presidents, Messrs. E. E. Pescott, F.L.S., and J. Searle; hon. treasurer, Mr. A. G. Hooke; hon. librarian, Mr. H. Hughes; hon. editor, Mr. F. G. A. Barnard; hon. secretary, Mr. C. Oke; hon. assistant secretary and librarian, Mr. H. B. Williamson, F.L.S.; committee, Messrs. F. Chapman, A.L.S., J. A. Kershaw, Dr. C. S. Sutton, L. Thoin, and F. E. Wilson.

On the motion of Messrs. J. Stickland and J. H. Harvey, a vote of thanks was unanimously passed to the retiring office-bearers, with special mention of the services of Messrs. Pitcher and St. John.

PAPER READ.

By Mr. T. S. Hart, M.A., B.Sc., entitled "Botanical Notes about Bairnsdale and the Eastern Lakes."

The author gave a description of the main features of the plants of the Bairnsdale district, and showed how their distribution was affected by the geological formations of the area.

Messrs. Chapman, Williamson, Pitcher, and Barnard remarked on the very great interest of the paper, the latter suggesting that Mr. Hart be asked to supply a map for publication with the paper, indicating the geological formations and plant associations.

EXHIBITS.

By Mr. A. G. Brown.—Bark of *Eucalyptus sideroxylon* (a

portion of middle bark in which some unusual hardening condition had taken place), also leaves, buds, flowers, and fruits; wood of *Eucalyptus polyanthemos*, Red Box, also leaves and fruit; *Eucalyptus viminalis*, leaves, buds, and fruits; *Eucalyptus botryoides*, Mahogany Gum, leaves and fruits; *E. cornuta*, leaves and fruits, and photograph of tree; wood and bark of *Hedycarya angustifolia*, Austral Mulberry; wood and bark, also wood (polished) of *Myrsine variabilis*, Mutton-wood—the two last-named from Noojee.

By Miss I. Crespin.—Fossils from Green Gully, Keilor, including fossiliferous ironstone, polyzoal and foraminiferal limestone.

By Mr C. Daley, F.L.S.—Native stone axe from Brighton Beach; also photograph of forest scenery on road from Yarra Junction to Warburton, via Powelltown, Neerim, and M'Veigh's.

By Mr. J. E. Dixon.—Specimens of *Oxycaeculus frenchii*, a small hemipterous insect recently found in thousands among débris and stones in Yarra Park and on the bank of the Yarra near Church-street bridge, Richmond.

By Miss A. Fuller.—Large series of dried plants from New Zealand.

By Mr. T. S. Hart, M.A., B.Sc.—Dried specimens, photographs, &c., in illustration of paper.

By Mr. A. E. Keep.—Red ochre, Ostracoda in Travertine limestone, and *Cerithium flemingtonense*, a Janjukian gasteropod—all from Green Gully excursion.

By Mr. C. Oke.—Specimen of moth, *Chelopteryx collesi* (male), taken at St. Kilda—very rare in such a locality.

By Mr. E. E. Pescott.—The Great Shielded Grasshopper, *Megalodon ensifer*, from Papua.

By Mr. A. L. Scott.—Tubes of coloured sand from Rainbow Mountain, near Rotorua, N.Z.

By Mr. J. Stickland.—Photo. of columnar rock formation at Trentham Waterfall, Victoria, by Mr. J. Stickland, jun.

After the usual conversazione the meeting terminated.

EXCURSION TO WERRIBEE GORGE.

A PARTY of twenty-three members and friends took part in the excursion to Werribee Gorge on Monday, 23rd April (Eight Hours Day). Compartments had been reserved on the Bacchus Marsh train, so the journey was made in comfort. The day was ideal, but the country was very brown owing to the long-continued absence of rain. Motors had been engaged to take us out to the entrance of the Gorge, some five miles from the station. The road through Maddingley along the southern bank of the river was followed as far as suitable for

such traffic, thence we followed the various tracks on foot. The stream was crossed on some slippery rocks, &c., just opposite the junction of Kelly's Creek. This crossing-place, marked on the tourist map "Crossing-place when river is low," could, with a little expenditure of cement-concrete, be made safer and available almost at any state of the river. The northern side of the stream, being less precipitous than the southern, affords the best opportunities for viewing the wonderful geological formations of the Gorge. After an inspection of the glacial deposits at Kelly's Creek, the party divided into two, the more active party keeping along the lower track, while the others took the upper track, agreeing to meet at the shelter shed at Picnic Point for lunch. On the way thither the magnificent view obtainable from "Full-View Point," 750 feet above the river, was greatly admired, and the geological features of the adjacent Gorge duly pointed out, while the "river" party was seen far below winding their way between the rocks and the stream. The shelter shed was reached long before any sign of the "river" party—in fact, we began to be alarmed as to their whereabouts, because we knew that at one jutting crag it was sometimes very difficult to get past, and, in addition, they would have a very strenuous climb up the hillside. However, they appeared at last, none the worse for their adventures, which had been somewhat severe. Some of the members then went on to the junction of the Myrniong Creek with the Werribee, examining on the way various exposures of Ordovician strata, glacial deposits, and other features of interest which have been recorded in previous accounts of visits to the Gorge. From near the upper shelter shed magnificent views are obtainable in several directions. This can be approached fairly closely by vehicles taking the main Ballarat road from Bacchus Marsh as far as Rose's Hill, and then turning in to the left at the guide-post.

I am indebted to Mr. A. G. Campbell, who formed one of the party, for the following non-geological report on the outing. He says:—"As far as plant life is concerned, the Gorge is an arid, unimproved defile, on whose rock-strewn slopes and cliff prominences vegetation procures but a scanty livelihood. The sparseness of the eucalyptus forest is very striking. In a bird's-eye view each tree seems to be isolated and fighting for a foothold among the rocks. Only on the spurs, where the eye looks along a thicker line, is there a forest tone. A spur sometimes means a diversity of species. On the north side will be found stringybarks and ironbarks, whilst the southern slope carries red and yellow box-trees. Near the upper shelter shed is a fine old White Ironbark, whose gnarled trunk tells only too plainly of battles with the elements. A few birds were

forming for its winter crop of flowers; two or three blossoms had already doffed their caps. There are some striking contrasts in plant life, for representatives of both the northern and southern floras are met with. On the point of the right-hand spur overlooking 'Eagle's Mirror' are two isolated, scraggy Murray Pines (*Callitris*), outpost of outposts, there being a well-known clump of better specimens high on the other side of the Gorge down-stream. Not far from 'View Point' is a clump of Bull Mallee, *Eucalyptus Behriana*, another visitor from the north, the trunks and tops of which are tangled with old companions—the Dodder, *Cassytha mclanthy*, and 'Old Man's Beard,' *Clematis microphylla*. Of anything in the nature of soil there is surprisingly little, most of the surface being covered with broken rocks of all shapes and sizes, such as might have been tumbled out of a railway cutting. The countryside has the appearance of being stricken with chronic aridity. Plant lists are all very well, but one must be excused at a time when floral organs are all too scarce and identification not rigidly correct. For a change let us look for something to admire in simple plant studies, always keeping in view that they express, in form and colour, the influence of their environment. So, while the geologists read their 'sermons in stones' with much interpolated argument, the botanists may find 'tongues in trees,' stopping awhile to glean the little story the plant is telling. A cameo picture is a salsolaceous plant, probably a *Rhagodia*, of grey-green colour, draping a lichen-covered rock in an upper cleft of which its twisted root has long been fixed. Those olive-coloured bushes are an Epacrid, *Brachyloma daphnoides*, but not a healthy colour for the species. They can stand a great deal of drought, but a good drink now would do them good. The Gold-dust Wattle, *Acacia acinacifolia*, grows in struggling tufts, which look as if they were casting about for whatever rock detritus is borne their way. Near the junction of the Myrnong Creek a fine specimen tree of *Acacia implexa*, the Sickle-leaved Lightwood, is noted, perched on a ledge of rock, drooping like a Myall, but quite at home in its arid site. High up on the hillside is a solitary Sheoak (*Casuarina*). Where has this tree developed its strange peculiarities, 'with leaves like wood and wood like iron'? Even the Ironbark, which imitates the Casuarina in wood and cortex, cannot withstand such hard conditions. We saw an 'old-man' Cassinia with a trunk two feet high and six inches through, bearded like a Messmate. Its leaves were dry and falling, but it may recover with the rain. Even of the flora in the Gorge, where better conditions should exist, the plant inhabitants are seen clinging among the rocks in the water in danger of being swept away when the winter floods come down.

The warm tones of *Hymenanthera banksii* and *Callistemon salignus* contrast with the lighter grey-green of *Leptospermum flavescens*, various *Cyperus*, *Juncus*, and *Arundo phragmites*. Stunted Blackwoods, *Acacia melanoxylon*, cling to the islets among the rapids, and ornament themselves with rifts of brown, curly seed-pods which are said to have saponaceous properties. On very limited flats or beds of shingle, which occur on the inside of a curve where the river swings some cliff-face, larger Blackwoods may be seen, and occasionally the white trunk of a Manna Gum, *Eucalyptus viminalis*. Very few plants or shrubs were seen in flower; the most admired of all was a Callistemon bush, whose blossoms, of an unusual pink colour, were nodding to their reflections in the stream. The brown, purse-like seed-vessels of some Bursarias were attractive. If in an empty sea-shell one may hear the 'melancholy murmur of the sea,' so in these empty purses one may listen to the whispers of the mountain breeze. Few birds were seen, the only one of note being a female Pink-breasted Robin, *Petroica rhodinogaster*, by the river, identified by her very dark brown wing-patch. Aloft, on the towering cliffs, white splashes indicated the eeries, perched on a ledge of rock, or in an undercut cave, from which Eagles have looked out for generations."

A leisurely walk back to the motors, a quick run back to the station, and train thence to town, ended an outing in which all expressed their enjoyment.—A. L. SCOTT.

EXCURSION TO GREEN GULLY, KEILOR.

ABOUT twenty members entrained to St. Albans on Saturday, 19th May, for the visit to Green Gully, near Keilor. Between the station and Green Gully, a distance of about two miles in a north-easterly direction, there was little to interest the field naturalist; the autumn rains had not appeared in sufficient quantity to influence the scanty vegetation. Green Gully is of particular interest to the geologist on account of the very interesting limestones which occur in the locality. As we approached Green Gully we were walking over the Newer Basalt which forms the western plains of Victoria. Passing down the slopes of the gully, we traversed a hard white quartzite about twenty-five feet thick. Then we came across a polyzoal limestone which lies in a small basin in the Older Basalt. This limestone represents fairly deep, clear, marine conditions. The fauna in the rock includes foraminifera, those minute organisms characterizing clear, moderately deep water conditions. The most prominent foram is the Lepidocycline. Polyzoal fragments are numerous, while in the more highly

iron-stained portions Lithothamnion is pronounced. From this interesting outcrop we passed down the hill to the creek, about 150 feet below, where three interesting features were noted. Firstly, the pavement caused by the denudation of the pentagonal-shaped columns of Older Basalt, a similar occurrence is to be found on the Merri Creek at Coburg. Secondly, the red ochre beds, due to the decomposition of the Older Basalt. Thirdly, a Travertine deposit containing a small Ostracod, also the Gasteropod *Coxiella strictula*, Menke, sp. It is an interesting fact that this form is absent from the living fauna in the creek, which now contains *Bythinella nigra*, thus pointing to changed conditions since the formation of the Travertine. Crossing the creek and climbing up the bank, we came across a fossiliferous ironstone, younger than the limestone noted on the opposite bank. The fossil casts, both internal and external, were well preserved, and the fauna indicated a shore-line deposit, the types found including *Haliotis navicularis*, *Cerithium flumingtonense*, *Magellania garibaldiana*, *Lima bassi*, *Turbo*, &c. On the opposite side of the creek, in the road cutting, a similar deposit was exposed. This also yielded fossils, both Gasteropods and Bivalves. On the Keilor side of Green Gully a band of chocolate-coloured grits, which are fossiliferous, was examined. The fossils here were fragmentary. Looking down the creek towards the Maribyrnong (Saltwater) River, beautiful meanders and flood-plains were illustrated. Up the road again towards St. Albans, a quarry has been cut in the Older Basalt, showing plainly the varying stages of decomposition of the rock. Still farther up the road were exposed some coarse and finely-bedded sands. These sands were creamy in colour, with bands of red and white ochre running through them. Where these sands were finely bedded they had been quarried as a China clay or some sort of cleanser. By this time the afternoon was well advanced, and the return to the station had to be entered on, giving opportunities for a chat over our experiences.—IRENE CRESPIN.

WHAT is known as a "mint" copy (one as clean as if just from the printer) of Fitzgerald's "Australian Orchids" was recently sold to a Melbourne plant-lover by Messrs. Robertson and Mullen for £25.

MR. R. S. Adamson, who recently spent some months in the study of the floras of South Australia, Victoria, and Tasmania, and, in conjunction with Professor Oshorn, of Adelaide, contributed a paper, "On the Ecology of the Ooldea District," to the Royal Society of South Australia, has been appointed to the chair of Botany in the Cape Town University.

THRIPS: AN UNPOPULAR INSECT, TREATED POPULARLY.

BY REGINALD KELLY.

(Read before the Field Naturalists' Club of Victoria, 10th May, 1923.)

IN December last Mr. Kershaw wrote to me asking me (*inter alia*) what I was doing with thrips, and would I give a paper on the subject, popularly treated, dealing, if possible, with the life-history, and giving a list of Victorian species. I replied that I was doing practically nothing in the matter just then, but would do what I could in the way he suggested.

Thrips is interesting from the etymological as well as the entomological aspect. You will notice that I use the word in the singular. It is the generic name of the typical genus given by Linnaeus, and is generally used in the same form for both singular and plural. Anglicized, it is used variously and peculiarly. By some the "s" is dropped to make the plural; this seems quite a natural and euphonic practice. Others reverse this. Chapman, in a paper later mentioned, refers to the misappropriation of the name by entomologists.

This insect belongs to, or rather constitutes, the order Thysanoptera—fringe-winged insects. Earlier naturalists declared the order to consist of one family only—viz., Thripidae—and this they divided into two sub-families—(1) Terebrantia, in which the female has an external toothed ovipositor, and (2) Tubulifera, in which the ovipositor is hidden and the tip of the abdomen is produced into an elongated tubular process. These two are now classed as sub-orders, and are divided into families—Terebrantia into Aelothripidae, Tubulifera into Idiothripidae and Philcoethripidae. The American authorities, however, class all the Tubulifera in the last-named family.

Earlier writers stated that the sub-order Terebrantia included all the European species, and that nearly all the Australian species are included in the Tubulifera. I have had the satisfaction of exploding this theory, as you will notice by the subjoined lists that most of the thrips taken by me belong to the Terebrantia.

The order was synonymously named Physapoda in reference to the bladder-like foot of the insect, a structure which enables it to cling to upright objects. The present name places the order in uniformity with the other insect classification according to wing structure.

Prior to 1914 I had been doing general entomology in a desultory way in connection with botanical work. In 1912 and 1913, in company with Dr. Eland Shaw, who was working on Orthoptera, particularly Blattidae, I gave the subject somewhat closer attention. In August, 1914, during the visit of

the European scientists, I met, amongst others, Prof. E. B. Poulton, of the Hope Museum, Oxford, who gave me two commissions—first, to make a collection of insects on a mimicry and protective coloration basis. This I did successfully, with the result that Professor Poulton wrote a very interesting paper on the collection, read at the Entomological Society, London (*vide* Proceedings, 3rd February—17th November, 1915), and the collection has been staged in the Hope Museum, and was there seen by one of my sons when on leave in 1916.

The second commission was to collect thrips for Mr. R. S. Bagnall, who had recently been appointed to the Hope Museum, and was specializing in this branch and describing thrips from all parts of the world, and was anxious to get material from Australia, then almost a virgin field. I was with Dr. Shaw when we took the new species, *Orothrips australis*, on *Xanthorrhoea australis* at Myers Creek, Healesville, in October, 1913, described by Bagnall in *Annals and Magazine of Natural History* (eighth series), vol. xiii., March, 1914. In the latter half of that year I collected seriously, and took a great number of specimens in Victoria, New South Wales, and Queensland—in the latter State as far north as Townsville and out in the cane-fields near Brandon. One of the specimens so collected Bagnall named after me, and is exhibited to-night as *Physothrips Kellyanus*, Bagn.

To enable me to do serious work in the order it was necessary to get literature on the subject, and this I found most difficult, neither Uzel's monograph nor those of Halliday, Karny, or Hinds being available, and I had to scratch up my data and general information from various odd sources, and had to content myself with collecting and sending my collections to Bagnall for examination and description. This course I consider advisable, as, when one capable man is describing and is in earnest, it is best to let the work be done by him, thus saving working at cross purposes, and consequent error and confusion.

Much work has been done in the last two decades in the United States of America, and several men there describe, but they follow a uniform system, and their work has to be vised by the Bureau of Agriculture. This, however, I fear, has a tendency to overnaming, so that every thrips in the plate has a tag on it, and becomes a free-born American citizen. However, I should not be unkind in my remarks, as I have received the utmost assistance and courtesy from the Washington authorities, and they have sent me any literature I have wanted promptly and free, with assurances that I should only have to ask and receive. Certainly I promised to reciprocate with

material and data, a promise I intend to honour as soon as I have it worthily collected and collated.

During the war I sent a great deal of material to Bagnall, but evidently a lot of it was lost at sea. With the end of the war and mental reaction came apathy, and I must confess I have not since given the subject the attention it deserves, and I am afraid Bagnall must be despairing of me by now. However, Froggatt has sent him some material, quite different from mine; and I am now swamping him with further collections.

On the 28th November, 1914, the late Mr. J. Booth wrote me for information on this subject, and I gave him a résumé of my notes and correspondence, which he incorporated later in a paper before the Microscopical Society of Victoria. Other work done has been by Tepper and Froggatt, but, so far as I am aware, the latter has not published anything on the subject since the short reference to the order in his "Australian Insects."

In the *Argus*, Saturday, 28th December, 1918, F. Chapman contributed a popular and very interesting article, approaching the subject from the aspect of his own branch—geology—dealing with fossil thrips, and generally from text-book material, and touching on the subject of thrips' enemies and parasites. Here I would refer those interested to Bagnall's article on *Stenurothrips succineus*, gen. et sp. nov., an interesting Tertiary Thysanopteron, a fossil insect in amber (*Geological Magazine*, dec. 6, vol. 1, No. 605, pp. 483-5, Nov., 1914), and to a paper by H. M. Russell, U.S.A., on "An Internal Parasite of Thysanoptera," *Thripoctenus Russellii*, Crawford (Technical Series No. 23, part ii., U.S.A. Department of Agriculture, Bureau of Entomology, 27th April, 1912), and incidentally on thrips' parasites.

In passing, I would say that I do not agree with the suggestion in Chapman's article that "one of the functions of thrips may be, in the case of roses, to check superabundant floral growth, thus saving the life of the plant during the driest weather." If it does so it is consequent only. My observations lead me to believe that Nature is essentially selfish, even in its altruism. No part of Nature acts from an unselfish motive, no matter what the result may be, except in one direction, and that is selfish in its own selflessness—viz., preservation of its own race; for this, despite attempts to preserve itself first, the individual must be sacrificed, then the species, then the genus, but last the race. Chapman's quotation that "nothing walks on aimless feet," on which he has based his suggestions, still remains a verity.

With these references, from which those who really wish

to study the order may obtain necessary information without reiteration, I will pass on to my own observations.

As the result of a number of tests, I will provisionally indicate the life-history and deal as far as possible with resultant queries. The divisions of the order are set out sufficiently for my purpose in the appended lists of Australian species.

The eggs are laid generally on the under page of the leaf of the principal food plant, sometimes inserted into the tissue, partially or wholly, sometimes just adhering to the surface around the edge of the leaf, protected by the marginal vein, and when thus placed look like a row of minute pearls, but when closely examined are found to be reniform. In this position they can be easily found on *Prostanthera lasiantha*. When inserted into the tissue they have on the leaf a somewhat similar effect to the punctures made in feeding. In the latter case, by the absorption of the chlorophyll, the spots become white, and, when many, they cause a shrinkage and curling of the leaf, sometimes total withering. By the insertion of the egg minute reniform callouses are formed, but the leaf is not so much injured, as its preservation is necessary to that of the egg, and probably forms the first food of the larva. The period of incubation is from a fortnight to three weeks, varying with temperature. In the larval stage it progresses through, at least, two moults, feeding gregariously on the more tender parts of the leaf. The larvae of most species are white, but some are very brightly coloured—orange or crimson. Of the latter, I took many from the flowers of the American tree *Catalpa bignoniensis*, and they were probably larvae of a species of *Haplothrips*. The first moult takes from three to five days from emergence, and after a like or slightly longer period the larva moults again, and enters upon its prepupal or nymph stage. The discarded skin is found often attached to the plant. As far as my observation goes, it is usually thrown off by a vertical split, vest fashion, although I have seen some moults which have been vacated at the head. There are two pupal stages which may moult differently, or the larva different from the pupa. In the prepupal stage there is movement; the pupal or later stage is more, but not altogether, quiescent, and is affected by light and other forms of irritation. The change from the prepupa to the pupa is by another moult—obvious stages of metamorphosis.

I have prepared a rough time-table of the life-history from my own observations, which I have checked with such records as I could obtain. It must be remembered that, as the hatching and subsequent processes are produced extra-corporeally, temperature and moisture have a hastening or delaying effect, and there is variation as to time in species, and particularly genera. The observations are principally on

species of *Physothrips* and *Heliothrips*, particularly *Haemorrhoidalis*, a ubiquitous species, probably of American origin.

TABLE OF LIFE CYCLE.

			Days.	
			Min.	Max.
Incubation of egg	--	--	14	21
To first larval moult	--	--	3	5
" second larval moult	--	--	3	5
" first pupal moult	--	--	2	3
" second pupal moult	--	--	2	3
" impregnation	--	--	2	2
" gestation	--	--	1	1
			—	—
			27	40

So that from deposit of egg to deposit of egg may be fixed at one month.

I have no reliable data from my own observations as to the life of an adult, but it has been variously estimated by observers, and can be taken under favourable circumstances at from 90 to 100 days, during which period it may produce eggs at the rate of five or more daily for two months. Some late adult females hibernate and produce a small brood in the early spring, and from these is produced the next summer swarm. It is apparent, then, that a mild winter and a warm, humid spring will be most productive of thrips.

I append hereto (1) a list of Australian species; (2) a list of Papuan species furnished to me by Bagnall; (3) a list of the mounted specimens exhibited by me to-night, of which the non-Australian species are shown for comparison and as links.

The study is not an easy one; exact identification and most observation must be done by microscope. There are many phases to be studied. One is the question of flight. Ordinarily these insects leap very quickly, but rarely use their beautifully-fringed wings. It is very doubtful if they can fly far; some species, indeed, are apterous. There is also the fact of parthenogenesis, which renders many investigations into life-history abortive. As these insects sometimes breed asexually, specimens of such broods under observation are sterile, and eggs infertile afford no results; time is wasted, and the observations have to be remade, with possibly like failures.

Males in many species are rare, and parthenogenesis is generally considered characteristic of the order. H. M. Russell says (Bulletin 118, Bureau of Ent., U.S.A., 1912):—"The green-house thrips, *H. haemorrhoidalis*, reproduces asexually only, the male having never been discovered." That the male has never been discovered is probably incontrovertible, but strange, as the species has been known since 1833, when it was described

by Bouché, and has been found in large numbers in most parts of the world, and is perhaps the most common species. There are two explanations of this—(a) the scarcity of males in most, if not all, species, their greater activity, and ability to escape when the food plant is disturbed, making the chances of capturing them remote; (b) they may differ so much from the female as not to have been recognized as the male of the species, as happened in the case of *Blattidae* (see Eland Shaw, *Vic. Nat.*), where the male and female were described by different naturalists not only as distinct species, but widely different genera, and the missing sexes remained a puzzle until Dr. Shaw and I fortunately took several of the pairs in coition. Colour is also lent to this explanation by the fact that different species have frequently been seen feeding together—e.g., *Heliothrips rubrocinctus* (discovered in 1901), of which the male is rarely taken, and *H. fasciatus* (discovered in 1895), the male whereof was wrongly described by Miss Daniels in 1904 as *Caliothrips Woodworthi*. In this species the proportion of males to females is about 25 per cent. As to the assertion that *H. haemorrhoidalis* produces asexually only, Russell put this more moderately in his former Bulletin 64, part vi., where he said:—"The male has not been described, and this species is without question parthenogenetic for many generations." That, too, I beg leave to doubt. It bumps hard into the belief that asexually-produced generations are infertile. I refer to these matters principally to point out an interesting subject for research, and suggest as a slogan, not "Cherchez la femme," but "Cherchez l'homme." To determine sex, specimens have to be microscopically examined.

I would like to deal with some of the species exhibited, but let it suffice to call attention to that largest of all world species, *Idolothrips marginata (speculum)*, Hal. I found this very plentiful at Ringwood and Healesville on recently dead leaves of *Eucalyptus obliqua*, but never on any other. Also to *Limothrips ceroalium*, Hal., which I captured on wheat at Sydenham. It was described by Halliday in 1852; redescribed by Hinds, 1902, and named by him *L. avenæ*—the oats thrips. It is recorded from England, Germany, the United States, and now Australia.

Bagnall is still engaged on a lot of other new material I sent him, and additional descriptions are possibly in print. I daresay Froggatt has received them as a reward for greater industry, but I hope soon to be in possession, and for that reason regret dealing with the subject prematurely, and trust that you will regard this paper as merely a preliminary survey, and subject to correction and review.

Whenever the subject of thrips has been mentioned I have almost invariably been asked how to get rid of them. That

is not my branch of the work, but of the economic entomologist. If, however, the selfish, destructive passion dominates you, I will point out a deduction to be drawn from this paper. Do not wait till the enemy is in force; attack the few survivors holding the winter trenches. Destroy the progenitors of next year's hosts. They hide in the ground. Keep your garden clean; expose them to cold of winter. They infest old leaves and flowers, stems and bark. Apply your cleansing remedies to these. Burn dead leaves and rubbish; strike when the enemy is weak.

The damage done by garden and orchard thrips is principally to the pistil. The insect perforates and sucks the style, the flower shrivels, and fruit fails to set. They also attack the tender foliage, particularly that of dahlias. In investigating and determining native species I am taking records of those that are leaving the hard food of the bush for more tender and succulent cultivated plants. It will be obvious that if this takes place, as in all cases where the food supply is better and more plentiful, the species will thrive and multiply. This also applies to introduced species coming into a more congenial environment. It is quite possible that this theory may account for the number of *Terebrantia* in my collection. Some of them may be wide variants of introduced species.

I will be deeply indebted to anyone who can send me thrips from various localities. They should be sent in 60 per cent. spirit in small tubes, with a label enclosed giving place, date, and name of plant on which taken, written in lead pencil.

LIST I.

AUSTRALIAN SPECIES.

ORDER THYSANOPTERA (SYN. PHYSAPODA).

Sub-Order *Terebrantia*.

Family *Aelothripidae*.

Orothrips propinquus, Bagnall.

 " *australis*, Bagnall.

 " *tenuicornis*, Bagnall.

Cranothrips Poultoni, Bagnall.

Family *Thripidae*.

Limothrips cerealium, Hal.

Odontothrips fasciatipennis, Bagnall.

 " *australis*, Bagnall.

 " *bispinosus*, Bagnall.

Physothrips cinctipennis, Bagnall.

 " *Kellyanus*, Bagnall.

 " *brevicornis*, Bagnall.

 " *seticollis*, Bagnall.

 " *setipennis*, Bagnall.

Pseudothrips parvus, Bagnall.

Pseudothrips achaetus, Bagnall.
Heliothrips haemorrhoidalis, Bouché.
 " *frontalis*, Bagnall.
Australothrips bicolor, Bagnall.
Isoneurothrips australis, Bagnall.

Sub-Order Tubulifera.

Family *Idolothripidae*.

Mecynothrips Wallacei, Bagnall.
Idolothrips marginata, Hal. (Spectrum.)

Family *Phloeothripidae*.

Eurynothrips denticollis, Bagnall.
 " *magnicollis*, Bagnall.
Kladothrips rugosus, Froggatt.
Horristothrips australis, Froggatt.
Pygothrips australis, Hood
Rhopalothrips Froggatti, Bagnall.
 " *brunneus*, Bagnall.
Œdemonthrips propinquus, Bagnall.
Haplothrips victoriensis, Bagnall.
 " *melanoceratus*, Bagnall.
 " *robustus*, Bagnall.
Cryptothrips Shavianus, Bagnall.

LIST II.

PAPUAN THIRPS.

(By favour R. S. Bagnall.)

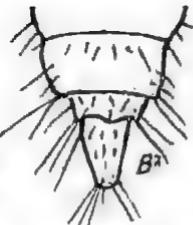
Terebrantia (small flower species).

Selenothrips decolor, Karny, from Cacao.
Heliothrips longiceps, Karny.
 " *globiceps*, Karny.
 " *Aulmanni*, Karny, from Cacao. } $\frac{1}{2}$ to 2 mm. long.
Euthrips flavicinctus, Karny.
Franklinella tenuicornis, Uzel.

Tubulifera (usually large).

Mecynothrips Wallacei, Bagnall, 14 mm. long.
Dimothrips Sumatrensis, Bagnall.
Macrothrips Papuensis, Bagnall.
 " *intermedius*, Bagnall.
 " *dubius*, Bagnall. } All large and massive.
Machatothrips biuncinata, Bagnall.
Ecacanthothrips sanguineus, Bagnall.
 " *crassiceps*, K.
Orinothrips inervis, Buffa.
Liothrips gigas, K. } Moderately large.
Phloeothrips spinipes, Bagnall.
Tricothrips papua, K.
Hinderania brevitulens.
Haplothrips microphthalmus, K. } About 2 to 5 mm. long.

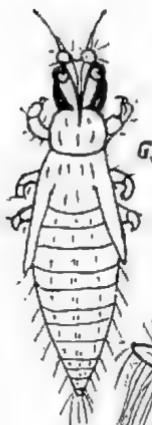
PLATE IV.



Typical termination of Abdomen in
TEREBRANTIA. (A') male (B') Female

Typical termination of Abdomen
in Tubulifera (A') male (B') Female

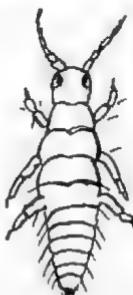
C.



D.



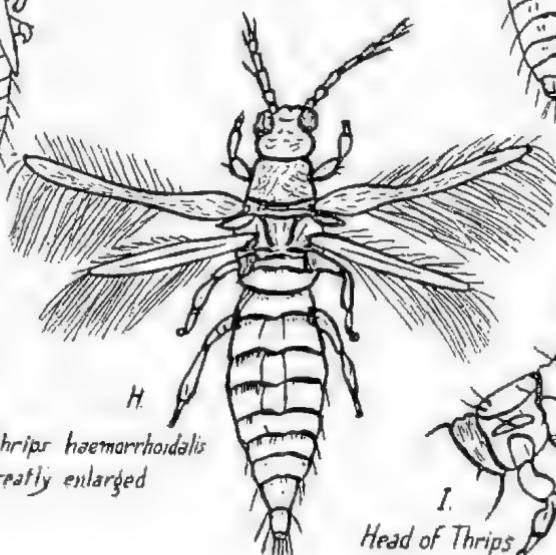
E.



F.



H.



Heliothrips haemorrhoidalis
Greatly enlarged



I.
Head of Thrip.

LIST III.
SLIDES EXHIBITED.

- 1.—*Cranothrips Poultoni*, B., ♀, collected by E. B. Poulton on flowers at Fremantle, W.A. (co-type).
- 2.—*Limothrips cerealium*, Hal., ♂, collected by R. K. on wheat at Sydenham.
- 3.—*Limothrips cerealium*, Hal., ♀, collected by R. K. on wheat at Sydenham.
- 4.—*Odontothrips fasciatuspennis*, B., ♀♀, collected by E. B. Poulton on *Mesembryanthemum* at Outer Harbour, S.A. (co-types).
- 5.—*O. australis*, B., ♀♀, collected by E. B. Poulton on papilionaceous flowers at Mundaring Weir, W.A. (co-types).
- 6.—*Physothrips cinctipennis*, B., ♀♀, collected by R. K. on small pea-flowers at Brandon, N.Q. (co-types).
- 7.—*P. Kellyanus*, B., ♀♀, collected by R. K. in Brisbane Botanical Gardens (co-types).
- 8.—*P. brevicornis*, B., ♀♀, ♂♂, collected by R. K. on *Helianthus* at Healesville, Victoria.
- 9.—*P. setipennis*, B., collected by R. K. at Healesville.
- 10.—*P. usilatus*, B., ♀♀, Pusa, Bengal, India, closely allied to *P. cinctipennis*, B.
- 11.—*Pseudothrips parvus*, B., ♀, collected by R. K. at Brandon, Q., on *Helianthus* (co-type).
- 12.—*P. achaetus*, B., ♀♀, collected by E. B. Poulton at Mount Lofty, S.A. (co-types).
- 13.—*Heliothrips haemorrhoidalis*, Bouché, ♀, collected by R. K. at Healesville, Vic., on *Eucalyptus viminalis* (gum-leaves).
- 14.—*Australothrips bicolor*, B., ♀♀, ♂♂, collected by R. K. at Healesville on *Eucalyptus viminalis* (co-types).
- 15.—*Isoncurothrips australis*, B., ♀, collected by E. B. Poulton on flowers of *Acacia pulchella* at Cottesloe Beach, Fremantle, W.A.
- 16.—*Idolothrips marginata*, Hal., ♀, collected by R. K. (see text).
- 17.—*Idolothrips marginata*, Hal., ♂, (spectrum) (vide text).
- 18.—*Haplothrips victoriensis*, B., ♀, collected by R. K. at Healesville, Vic., on *Acacia decurrens*, var. *mollissima* (co-type).
- 19.—*Thrips japonicus*, B., collected by J. A. E. Lewis at Kobe, Japan (co-type). This is exhibited as a beautiful specimen and as an example of the typical genus.

EXPLANATION OF PLATE.

C Egg.	F Prepupa.
D Larva, early stage.	G Pupa.
E „ later stage.	

All greatly enlarged.

NOTE.—In *H* the left antenna should have been drawn with 5 joints and 6 segments, as in the right antenna. *I* Adapted from Moulton.

THE MOLOCH LIZARD, *MOLOCH HORRIDUS*, GRAY.

THIS most extraordinary lizard is found only in Western Australia and parts of South Australia. It belongs to the family Agamidae, which includes so many of our typical Australian lizards. The Moloch reminds one of the curious little lizard, *Phrynosoma cornutum*, or "Californian Toad," as it is commonly called, but the latter lizard differs from the Moloch in the position of its teeth, these being pleurodont—that is, in having the teeth attached to the inner side of the parapet of the jaws instead of having them attached to the summits of the jaws, as in the acrodont type, to which group the Moloch belongs: so that, although from an external appearance the *Phrynosoma* appears very much like an agamid lizard, its proper place is in the Iguanidae, which family has no representative in Australia.

Some notes on a pair of Molochs which I received on the 12th of September last year from Mr. J. Clark, the well-known entomologist of Perth, W.A., may be of interest. These—a male and female—came by post enclosed in a small, close-fitting tin box, the Molochs being hardly alive on arrival. This was not surprising, as in a letter received from Mr. Clark about the same time it was stated that the Molochs were captured at Mundi-Windi, in North-West Australia, on the 26th August, and had afterwards travelled 200 miles by camel, followed by a motor trip, arriving at Perth on 6th September, reaching me on the 12th of the same month. So that, considering they were enclosed in a tight-fitting tin box, which was also securely wrapped in brown paper, they must have existed for all this period on the small amount of air contained in the box, the dimensions of which was 9 inches by 4 inches by 1½ inches. During the next day, the 13th September, the lizards had somewhat recovered from the partial suffocation they had undergone, but the next difficulty was to feed them. Having already heard that these lizards feed chiefly upon ants, and, as could easily be seen, the Molochs were becoming thin owing to the lack of feed and drink, yet it was all of no avail that I collected white ants for them, as the lizards would not even look at these. Previously, I was under the impression that white ants would prove irresistible to insect-eating lizards, but, as the Molochs refused to have anything to do with these insects, ants of various genera and species were collected for them, some of which were as follows:—*Iridomyrmex detectus*, *Iridomyrmex nitidus*, *Ectatomma metallicum*, *Monomorium pharaonis*, *Polyrachis semi-aurata*, *Camponotus nigriceps*, and a species of *Pheidole*, but the Molochs would have none of them. The lizards were by this time becoming thin, as could plainly be seen by their tails, which, by the way, is always a guide to

the condition of reptiles, no matter whether these are lizards, snakes, tortoises, or crocodiles.

On the 19th October a small, thin line of the small, evil-smelling black ant, *Iridomyrmex rufoniger*, var. *domesticus*, Forel, was noticed, the individuals of which were either coming or going to a feast furnished by the remains of a crushed garden snail; so, as a last resource, the Molochs were placed on the ground facing the line of ants, and to my surprise commenced feeding rapidly upon these small but bad tasting and smelling creatures. Since that time they have eaten many thousands of this ant. The strange taste of the Molochs in selecting this ant and avoiding those of other species which might easily be thought to be much better eating came as a surprise. The size of the ant in this instance had nothing to do with it, as they absolutely refuse to eat ants that are either a little larger or smaller than this species.

The number of ants consumed at a meal is astonishing. Each ant is taken up by means of flipping out the tongue, to which the ant adheres in the same manner as the chameleon takes its food. The average number of ants consumed per minute by a Moloch is forty-five, providing that the day is hot and ants are plentiful, so that for a meal lasting for fifteen minutes (which is about the usual time they take in which to fill themselves), gives a total of 675 ants. This, at only two meals per day, gives 1,350 ants per Moloch, or, for both of them, 2,700 ants per day.

It was remarkable that on some days, when the ants were busily engaged in carrying their pupæ, that when such ants were taken by a Moloch they invariably dropped the pupa they were carrying, so that in the space of a few minutes the latter formed a small heap about 2 inches distant in front of the Moloch's head, this being the distance the pupæ were thrown by the force of the impact of the lizard's tongue, when the ants released their hold of the pupæ.

Only on one occasion were the Molochs observed drinking, and this was accomplished by flicking out the tongue on to grass that had been recently hoed, so that the mode of drinking was like that of the chameleon.

Molochs are usually found living in dry, sandy wastes of Australia where water is absent or very nearly so; at any rate, they appear to have no idea of direct drinking otherwise than by flicking out the tongue. Another most remarkable thing is the hygroscopic nature of their skin, which absorbs moisture almost as readily as blotting paper. For animals living in desert areas this is a most useful provision of Nature, as it allows the creature to obtain all the moisture it requires from

dew, or even by coming into contact with dewy herbage. If one of these lizards be placed in a saucer that contains a small amount of water, the latter can be seen ascending the skin, until in a short space of time the animal has quite a saturated appearance, even to the top of its head.

In captivity Molochs retire for the night very early, and have a most peculiar habit of burying their head in sand; probably it is for this reason that their nostrils have apparently no direct opening that I can discover, even with the aid of a magnifying glass. It is also probably due to this peculiar trait of burying the head in sand that there is no external opening to the ear. The absence of an opening to the ear reminds one of our White-streaked Earless Lizard, *Tympanocryptis lineata*, Peters, formerly so plentiful on the plains between here and Geelong.

Molochs are remarkably early risers for land reptiles; probably this early rising is to obtain moisture before the heat of the day evaporates any dew that may be present. These lizards, although still in perfect health, have shown no signs yet of skin-shedding, and, although there are many reptiles that do not shed their skins, I know of no lizard that does not, so possibly skin-shedding with this lizard is not of frequent occurrence.

Molochs have the power of changing colour to a very remarkable degree, and, again, like the chameleon, it is mostly due to the influence of light and heat that causes the change to take place. During hot, bright days Molochs become quite gaily coloured in yellow and red, but on being removed to a cool and shady place they become darker, and at night are decidedly dark in colour.

These lizards are most docile, this being due, in my opinion, to stupidity combined with vigorous appetites, for if a line of ants is ascending a tree-trunk you have only to hold one of these lizards up to the ants, when it will lick them up just as freely as if it was placed on the ground.

The prolonged warm spell of weather we have been having is all in favour of keeping these lizards in good health, but I much doubt their ability to live through a Victorian winter, which must be very long when compared with that of North-West Australia, where there is hardly any winter at all. They have already been in captivity over eight months.

In walking, these lizards carry the tail in an almost perpendicular position, giving them a most comical aspect. Their quaint ways and great docility make them most charming little pets, in addition to which they are the most extraordinary of all our Australian reptiles.—H. W. DAVEY, F.E.S.

The Victorian Naturalist.

VOL. XL.—No. 4.

AUGUST 9, 1923.

No. 476.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 9th July, 1923.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about fifty members and visitors were present.

The president said that since the last meeting another member of the Club had passed away after a long and serious illness. Though Mr. J. Cronin had not been a frequent attendant at the Club meetings, he had in many ways shown his interest in the Club. He moved that a letter of sympathy be sent to his widow and family. This was seconded by Mr. F. G. A. Barnard and carried in silence, all standing.

REPORTS.

A report of the visit to the National Museum on Saturday, 18th June, was given by Mr. F. Chapman, A.L.S., palaeontologist to the Museum, who acted as leader on the occasion. He said that the afternoon had been devoted to the fossil galleries. There a large number of fossils and casts of extinct monsters were inspected, and their relationships to present-day animals pointed out. Opportunity was also taken to examine under the microscope foraminifera, &c., brought from the Antarctic by the Shackleton and Mawson expeditions, also foraminiferal limestone from Papua.

A report of the visit to the National Herbarium on Saturday, 30th June, was, in the absence of the leaders (Messrs. J. W. Audas, F.L.S., and P. F. Morris), given by the chairman, who said that a party of about twenty members had spent a very interesting afternoon at the Herbarium, where they had been shown some very rare and historic specimens and books. The Herbarium ranks among the leading ones of the world, and the facilities for reference to its contents were fully demonstrated.

Owing to the wet weather the excursion arranged for Ringwood on Saturday, 7th inst., was abandoned.

ELECTION OF MEMBERS.

On a ballot being taken, Miss Stella Lambert, Malvern-grove, Malvern; Sister Ethel Forsyth, Repatriation Hospital, Caulfield; Mr. Ian Macgillivray, Ormond College, Parkville; and Mr. David Newmarsh, 108 Heidelberg-road, Ivanhoe, were duly elected as ordinary members of the Club.

GENERAL BUSINESS.

Mr. E. Cox said that the Piscatorial Council of Victoria,

representing the various angling clubs, was desirous that a fish culturalist should be appointed by the Government with the view of thoroughly studying the habits of our native fish and endeavouring to promote the breeding of the more useful of them. He moved—"That this Club support the action of the Piscatorial Council in its endeavours to have a fish culturalist appointed, and to encourage the increase of the indigenous fishes." This was seconded by Mr. H. Whitmore.

Mr. H. W. Davey, F.E.S., said that great care should be exercised in the selection of the fishes to be cultivated. It was absurd and injurious to breed imported fishes when some of the indigenous species were far better as food fishes and were not so destructive to other inhabitants of the streams as those which had already been introduced. Mr. J. L. Robertson urged that some attention should be paid to marine fish, for, without a supply of sea fish, there would be no fishermen from whom to get recruits for the navy and mercantile marine service.

PAPER READ.

By Mr. A. N. Lewis, entitled "The Effect of the Ice Age on Tasmanian Topography."

The author, by means of a large series of excellent lantern slides, showed the effect of ice in changing the topography of a country. Tasmania had probably experienced two or three ice ages, and in the western and south-western portions had been severely carved by their agency. He pointed out the differences between the action of ice and that of water, the former giving a concave outline to the mountain, while the results of water were more or less convex.

Messrs. C. Daley, A. L. Scott, A. S. Kepp, J. H. Harvey, and F. Chapman, A.L.S., took part in an interesting discussion which followed.

EXHIBITS.

By Mr. F. G. A. Barnard.—Flowering branches of *Acacia elongata*, Long-podded Wattle, N.S.W., grown at Kew.

By Mr. G. Coghill.—Collection of shells, native weapons, and ornaments, &c., from Papua.

By Mr. C. French, jun.—A remarkable gall-making coccid (scale insect), *Apionomorpha fletcheri*, ♂, ♀, first time exhibited in Victoria, collected at Mooroolbark, Victoria, by C. French, jun., and C. L. Plumridge; specimens of *Plagianthus glomeratus*, Clustered Plagianth, from Altona Bay (usually found in the Malloo).

By Mr. H. W. Davey, F.E.S.—Case of Coleoptera, showing the three sub-families of Cerambycidae—viz., Prionides, Cerambycides, and Lamiides.

By Mr. E. E. Pescott, F.L.S.—(a) An aboriginal stone axe, showing very regular rectangular fractures on the unground surface; (b) a unique stone "mill," very small, having side grooves, indicating the possibility of its secondary use as a "sinker"—both from Western District, Victoria: flowers from cultivated plants of *Thryptomene Mitchelliana*, F. v. M., *Correa speciosa*, Andrews, foliage of *Kochia ledifolia*, F. v. M., and flowers of *Narcissus pachybolsbos*, a native *Narcissus*, from Algiers.

By Geological Survey, per Mr. A. E. Rodda.—Turquoise in slate and quartz, from North-Eastern district of Victoria.

By Mr. J. Seale.—Foraminifera from sands from New Hebrides.

After the usual conversation the meeting terminated.

EXCURSION TO THE NATIONAL MUSEUM.

A PARTY of twenty-five members and friends visited the fossil galleries at the Museum on Saturday afternoon, 16th June. The beautifully-finished disarticulated skull of the Indian Elephant in the zoological portion (one of the last pieces of work by the late Mr. T. F. Moore) was pointed out in relation to those of the fossil specimens seen later upstairs; this shows the parallel-ridged type of tooth seen in the Mammoth, and also in the fossil Indian elephants. As an introduction to the remarks on fossil examples in the gallery upstairs, a summary of the sequence of strata was given in front of the Table of Strata hung on wall. Interest was shown in the tracing of progressive stages in the groups of the elephants and the cetacea, and these, as well as aberrant types of the higher vertebrates, were pointed out in the fine series of fossil remains exhibited in the wall cases. The casts representing the group of the beaked lizards (*Rhyncocephalia*) were examined, and the comparatively large size of the Karoo specimens (*Mesosaurus*) were remarked upon. Amongst the many interesting modifications of the reptilian form were seen the fish lizards (*Ichthyosaurus*), with their porpoise-like outline and paddle-shaped limbs, and the flying reptiles (*Pterosauria*), ranging from the size of a sparrow (*Pterodactylus*) to the giant *Pteranodon* of the Cretaceous of Kansas, which had an expanse of 29 feet. The foreshadowing of several types of mammalian dentition was noticed in the curious anomodont reptiles, as *Dicroidodon* and *Trititylodon*. The history of fishes provides one of the most fascinating stories of the variations of a phylum in adapting itself to conditions of life and habits, each being interdependent and reflected in their curious shapes and internal structures. The earliest fishes were undoubtedly scaleless and slimy, but

they gradually made use of the excretory lime constituent to build up an armature of scales or plates; whilst the earliest mouth armature, used for procuring food, seems to have originated from the same scaly covering around the mouth. Early sharks had their teeth fused on the jaw, whilst most modern types have them embedded in cartilage and easily shed when worn. One genus, in Carboniferous times (*Helicoprion*), which was related to the common "Gummy," had its teeth coiled up as they went out of action. The extremes of form in the herbivorous group of the Edentates were seen in the Giant Sloth, evidently covered with rough hair, and the *Glyptodon*, with its thick encasement of a bony cuirass. A new addition to the collection, *Spirulirostra*, given by a Club member, formed the subject of some remarks on the variants in shape of some living and extinct cuttle-bones. After examining the scale and tooth of *Metaceraspisodus*, or Mud-fish, from the Jurassic of the Kilcunda district, as well as the claw of the unique Dinosaur from the same district, the members were asked to inspect a few specimens and types of structure in the palaeontological office, the microscope being used to show the foraminiferal deposits from the Shackleton and Mawson expeditions, and also some of the fossiliferous limestone of the oil country in Papua. From the number of questions put to the leader from time to time—some of them "posers"—it is safe to say that a few of the members, at least, considered the afternoon not unprofitably spent.—F. CHAPMAN.

THE LATE MR. J. CRONIN.—We regret to record the death of Mr. J. Cronin, F.R.H.S., Director of the Melbourne Botanic Gardens, on Saturday, 30th June. He had been in ill-health for a considerable time, and, though at times thought to be recovering, at last succumbed to a serious malady. He was elected a member of the Club in December, 1910, but, owing to official and other engagements, was seldom able to attend its meetings. He was an enthusiastic horticulturist, and had devoted considerable attention to hybridizing and improving garden flowers, such as dahlias, Watsonias, &c. In 1908 he succeeded Mr. W. B. Luffman as principal of the School of Horticulture, Burnley, and during the next year followed Mr. W. R. Guilfoyle as Director of the Botanic Gardens. His artistic tastes and judgment were often sought by corporations and others in laying out new parks and reserves, and in that way will be a distinct loss to the State. He encouraged the cultivation of indigenous plants and shrubs, and exercised considerable skill in their treatment.

THE AQUATIC PROTOZOA OF THE MELBOURNE DISTRICT.

PART I.

BY JOHN STICKLAND.

(Read before the Field Naturalists' Club of Victoria, 9th April, 1923.)

IT may be well to state, by way of preface, that the subject-matter of this paper is laid before you this evening with the hope that it may be of sufficient interest to induce some of the members to join the very thin ranks of the Club's students of aquatic life.

Field naturalists, it may be said with some approximation to the truth, have the world for their field, for, go wherever they may, something of interest will be found; rocks, plants, birds, insects arouse interest and admiration. All these objects are so much in evidence that they arrest and almost monopolize the attention of the majority of nature-students, and this, I think, accounts for what seems to me the limited amount of attention bestowed upon aquatic organisms in general. Yet how rich are the "watery wastes" in objects worthy of consideration—objects strange and wonderful, often very beautiful, and, for the most part, very unlike terrestrial forms! Passing over the beautiful aquatic flora and the larger fauna, of which we know practically nothing, it may be pointed out, in the first place, that almost every order of insects is represented amongst the denizens of the water in some or every stage of development, not excepting even the Lepidoptera. How strange and interesting their larval forms, and how wonderful their metamorphoses!

Here, among many others, we have the remarkable larva of the ephemera, with its tracheal gills arranged like rows of fans along its sides, spending, it may be, two years in its juvenile stages, and enjoying but a few hours of adult life. Tennyson, in his "Two Voices," describes the metamorphosis of the dragon-fly so vividly that, without vouching for his absolute scientific correctness, I venture to quote his words—

" To-day I saw a dragon-fly
Come from the wells where he did lie.

" An inner impulse rent the veil
Of his old husk; from head to tail
Came out clear plates of sapphire mail.

" He dried his wings; like gauze they grew
O'er croft and meadow wet with dew—
A living flush of light—he flew."

The Arachnidæ, the class containing spiders, also supplies its contribution to the inhabitants of the pond in the shape

of spiders, mites, and the strange "water-bear," *Macrobiotus*, which withstands desiccation so completely as to leave it a shapeless particle of matter, which, however, exhibits a perfect resurrection when conditions become favourable. Worms of various kinds are to be found, and pass, as far as we know, practically unnoticed. And what of the wonders of the sea—the Hydrozoa, with their marvellous alternation of generations, Polyzoa, and other forms too numerous to mention?

It is not my intention to say anything further concerning these (for the most part) macroscopic forms of life, but to bring under your notice a still more neglected group—the Protozoa. Other members of the Club have at rare intervals read papers dealing with rotifers and minute crustaceans, but I do not remember any dissertation on the subject of aquatic or other Protozoa forming part of the evening's business for a great many years. This may be the fault of the "pond-lifers" themselves; hence I venture to attempt to supply the deficiency now. The subject mentioned in the title of this paper is so large that I propose to divide it into two parts, and on this occasion give some description of what the Protozoa are, glance at their physiology, and describe a few forms in the lowest group, and at some future time, if it be thought desirable, to deal with the higher forms.

In answer to a supposed question as to what the Protozoa are, it may be stated, in the first place, that they are unicellular animals, and I particularly wish members to bear this in mind in order that they may realize how wonderfully modifications of parts of this single cell enable a protozoan to perform nearly all the vital functions noted in the case of highly-organized creatures. Perhaps a few words in explanation of what a cell is may not be out of place. A cell is a particle of protoplasm. In vegetable cells we find a definite enclosing envelope—the cell wall; in animal cells this is practically non-existent. The protoplasm of the cell, apart from the nucleus, is usually spoken of as the cytoplasm, and will be so designated in what follows. Within this cytoplasm is a specialized portion known as the nucleus, which is of vital importance. When viewed under the microscope with proper manipulation, both cytoplasm and nucleus in general present a reticular appearance. In addition to the nucleus, the infusorian cell is furnished with a micro-nucleus. The interstices in the network mentioned are filled with fluids—the cell sap and nuclear sap. The nucleus seems to be intimately connected with the nutrition of the cell, and the micro-nucleus (when present) with reproduction.

In the Metazoa, or many-celled animals, which group includes all the higher forms, the cells are differentiated and formed into tissues for the performance of necessary vital functions, while,

as mentioned before, this end is attained by a single cell in the case of the Protozoa—nutrition, locomotion (in many cases), and reproduction all are accomplished. A protozoan is thus a decidedly self-contained cell. Now, it must not be forgotten that Protozoa are not the only unicellular organisms, for there are innumerable plants coming under the same designation, such as desmids, diatoms, &c. This being the case, the question may be asked, What is the difference between the Protophyta and Protozoa? It is practically impossible to draw a clear line of demarcation between the two. It might be thought that the power of locomotion would be characteristic of animals only, but this is certainly not the case. On one occasion I collected some alga of a filamentous type in a gutter in the Treasury Gardens, and when examining it under the microscope was delighted to see the discharge of motile spores—zoospores—from some of the cells. These spores swam away rapidly by the aid of flagella.

The fact that the nutrition of the organism is holophytic—that is, after the manner of plants—owing to the presence of chlorophyll, or holozoic, or animal-like—that is, living upon organic matter—does not settle the question. Haeckel constituted an order—the Protisten-reich, or Protistan kingdom—for the reception of all these low forms, but it does not appear to be generally adopted.

In all animals nutrition is a prime necessity; hence the question arises, How is food taken in (or ingested, as it is termed) in such rudimentary forms? Various methods are adopted. In the case of the Sarcomina there is no mouth or anything of the kind. An Amœba, which is of the consistence of a somewhat liquid jelly, accomplishes this object by simply flowing round and engulfing its prey. Having digested its capture, it may get rid of any useless remainder by simply flowing away from it, thus exactly reversing the operation of ingestion. Another form, *Actinosphaerium*, is possessed of long, thread-like extensions of its cytoplasm, projecting in every direction. Having laid hold of a rotifer, say, by means of these "pseudopodia," it gradually retracts those in possession of the captive, sending out, in the meantime, further portions of its cytoplasm until the unfortunate victim is completely surrounded and then drawn into the interior of its captor and digested. One such operation which I watched must have taken from twenty minutes to half an hour to complete, not including the digestion spoken of. In many flagellate and ciliate forms there is a definite opening in one part of the cell through which food matter passes into the interior.

The process of ingestion can be exceedingly well observed in the Vorticellæ or Bell Animalcules. These creatures have

a well-defined pharynx beyond the oral aperture. The food matter is gathered by the action of cilia and collects at the end of the pharynx. When sufficient has accumulated a food vacuole is formed, which encloses a small quantity of water in addition to the food, the whole passing into the interior of the cell, and, moving round in the cytoplasm, digestion is accomplished. Several of these food vacuoles can be seen within the animal at one time. Any unassimilated residue is discharged through an anal aperture into the pharynx. Another type of ingestion is to be seen in the case of the suctorian forms, such as *Acineta*. The long tentacle-like appendages with which the animal is provided hold any minute creature which comes in contact with them fast. Concentrating several of the organellæ upon its prize, it sucks out the more fluid portion of its victim, which passes down the tentacles into the captor.

Digestion in the Protozoa is intracellular—that is, it takes place within the cell, the cytoplasm containing the necessary enzymes or ferments; thus a stomach, with its gastric juices, is dispensed with. A person observing a protozoon steadily for some little time would probably note a small clear space or vesicle gradually forming within the cytoplasm, and growing in size until it suddenly disappeared. This is known as the contractile vacuole, and performs a very important part in the animal's economy. It serves as an excretory organ, and takes part also in the process of respiration. Along with the food in the food vacuoles, and in other ways, water enters the cytoplasm, and, as this water contains air, the necessary oxygenation of the cell is accomplished. The carbon dioxide and other products of metabolism in the animal collect in the contractile vacuole, which finally discharges its contents outside the cell, which accounts for its temporary disappearance. In this way both respiration and excretion are provided for.

Locomotion in the Protozoa is accomplished in various ways. In the case of *Amœba* it consists in a peculiar sort of flowing of the whole cytoplasm, no locomotor organellæ existing. The testaceous Rhizopods extend protoplasmic processes, or pseudopodia, by means of which they creep along. In the flagellate forms pseudopodia are dispensed with, and replaced by one or more whip-like organellæ—flagella—by the motion of which the animals are drawn along. The Infusoria or Ciliates possess much smaller hair-like appendages in great numbers, as a rule, by the rhythmic waving of which locomotion is effected. In some of the Infusoria the cilia on the ventral surface are joined together into "cirri," comparatively stout organellæ, by means of which the animals walk in a most

unmistakable manner. In very many cases the locomotor organellæ are used also for the capture of food.

In the methods by which reproduction is accomplished there is much of interest to the observer. When the cell is fully grown, cell division commences. The nucleus first exhibits the phenomenon known as mitosis, or karyokinesis, which in many Protozoa is less elaborate than in the Metazoan cell. This being completed, the cell separates into two. This action is known as "fission." Fission may be either longitudinal (as in the case of *Vorticella*) or transverse (as in *Stentor*). A reconstituted nucleus goes into each half of the dividing cell; thus two new animals are formed. It is impossible to distinguish between parent and offspring here—in short, a sort of immortality exists. Careful experiments have proved that fission may continue to take place almost indefinitely under favourable conditions. In such an experiment a single individual is isolated after each division and placed in a nutrient medium. Such favourable environment does not always exist under natural conditions, if ever, so a sort of senile decay sets in after a number of fissions as described. But these lowly organisms have discovered a way to renew their youth. This is brought about by what is known in a general way as conjugation. Conjugation may be of two similar individuals, when it is known as isogamy; or one conjugant may differ from the other, when the operation is called anisogamy. When conjugating, two animals unite, and an interchange of nuclear matter takes place. Two new nuclei are formed—in the case of the Infusoria from the micro-nuclei—and the conjugants separating, each provided with a new nucleus, are rejuvenated. Conjugation is not always of this temporary kind. In the case of *Vorticella*, for instance, a zooid breaks up into small gametes, one of which, coming into contact with an animal of the ordinary size, attaches itself to it and is completely absorbed. The small or active gamete is regarded as the male. Encystment and spore-formation occurs amongst the Protozoa. An animal contracts, surrounds itself with a hardened envelope, and breaks up into spore-like bodies, which escape from the cyst and eventually develop into forms like the parent.

Protozoa are very differently classified by authorities, but the following classes are very generally recognized—viz., Sarcodina, which consists of forms furnished with or capable of protruding either lobose or thread-like pseudopodia; Mastigophora, Protozoa having one or more whip-like organellæ; Sporozoa and Hemosflagellites, internal parasites, many of which are pathogenic or disease-producing organisms; and Infusoria, comprising forms bearing cilia in some or all stages of their existence. The Sporozoa and Hemosflagellates

not being aquatic in their habits, are outside the scope of this paper.

The class Sarcodina may be subdivided, according to Minchin, into two sub-classes, Rhizopoda and Actinopoda. The first of these, Rhizopoda, contains four very distinct orders, with two of which—Amœbæa and Foraminifera—I propose to deal. Amœbæa is again divisible into sub-orders, with the second of which—Lobosa—we are interested. Lobosa falls very naturally into two sections—Nudæ, or naked forms, and Testacea, animals secreting a test or shell. Many of the Lobosa type are to be found amongst plants or in the sediment at the bottom of shallow pools of long standing; hence they are sometimes called sapropelic, or limicolous or mud-inhabiting organisms.

I will commence the description of a few representative forms of Rhizopoda with Amœba, which is well known by repute to all students of biology, but is, I think, rarely seen. It is so very variable in shape that its identification is a matter of considerable difficulty. It is an absolutely microscopic speck of naked protoplasm of a somewhat liquid consistency, as before stated. The ectoplasm or outward part is stiffened, in a measure, by contact with the water by which it is surrounded. This outer film seems to give way, and some of the protoplasm streams out in a blunt outflow; all the remainder may follow, or it may reverse and flow out again in quite a different direction. Should it go straight on, however, its progress is exceedingly slow. Several species, probably, are to be taken in our ponds. Of these we have been able to identify with something like certainty *Amœba proteus*, Leidy, and a somewhat star-like form called *Dactylosphaerium (Amœba) radiatum*, Bütschli.

The group Testacea has more numerous representatives, one of the most common genera being *Diffugia*, Leclerc. These animals construct their domiciles of sand grains as a rule, in shape spherical, oval, or pyriform. The test is open at one end, and through this opening blunt pseudopodia are protruded at pleasure. Quite a number of species have been included in our takings from time to time, of which *D. corona*, Wallich, is perhaps the most ornate. The test of this form, as indicated by its name, is surrounded at the fundus (or end opposite the mouth) by a variable number of blunt spines, which give it the shape of a coronet. *Centropyxis*, Stein, is another Rhizopod which constructs a test of sand grains. In shape it is much flatter than *Diffugia*. *C. aculeata*, Ehr., is the species most common. It has a varying number of blunt spines projecting from the edge of the test. A variety without spines, named *scorpius*, Leidy, is not so common.

Arcella, Ehr., is a form bearing considerable resemblance

to *Centropyxis cornis* in shape. The test, however, is chitinous, and covered all over with dot-like markings in many cases. In colour it varies from rich brown to pale yellow in the younger specimens. *Arcella*, like some other Rhizopods with tests, can form gas bubbles within its cytoplasm, and thus alter its specific gravity, enabling it to rise or fall in the water. *A. vulgaris*, varieties *gibbosa*, G. S. West, and *angulosa*, Leidy, are the prettiest of the fairly numerous species obtainable. Reproduction by budding is frequent with Arcellids. *Euglypha*, Duj., is not so common as the before-mentioned forms. It is interesting not only by reason of the beauty of its test, but also from the fact that this test is constructed of chitinous plates formed within the cytoplasm and transferred to the surface.

Lesquerella spiralis, Schlumb., constructs a handsome test of vermicular pellets, but unfortunately is somewhat rare, as is also *Trinema*, the test of which is so much bent that the mouth opening appears to be in the side when viewed on that surface.

Unfortunately, we have not come across any ponds near Melbourne containing Sphagnum, and many genera of the Rhizopoda which are partial to this moss as their habitat have never come under our notice; and of the few other places rich in these forms most have passed out of existence or are no longer available.

The Foraminifera constitute the second order of the Rhizopoda, and are characterized by the formation of shells, in most cases pierced with minute holes, through which fine, thread-like pseudopodia are extended. They are, almost without exception, marine, and it has not been our good fortune to take any living specimens. The empty shells of *Polystomella crispa* may be found in the ripple-marks on sand-banks left by the retiring tide at Black Rock and doubtless many other of our beaches.

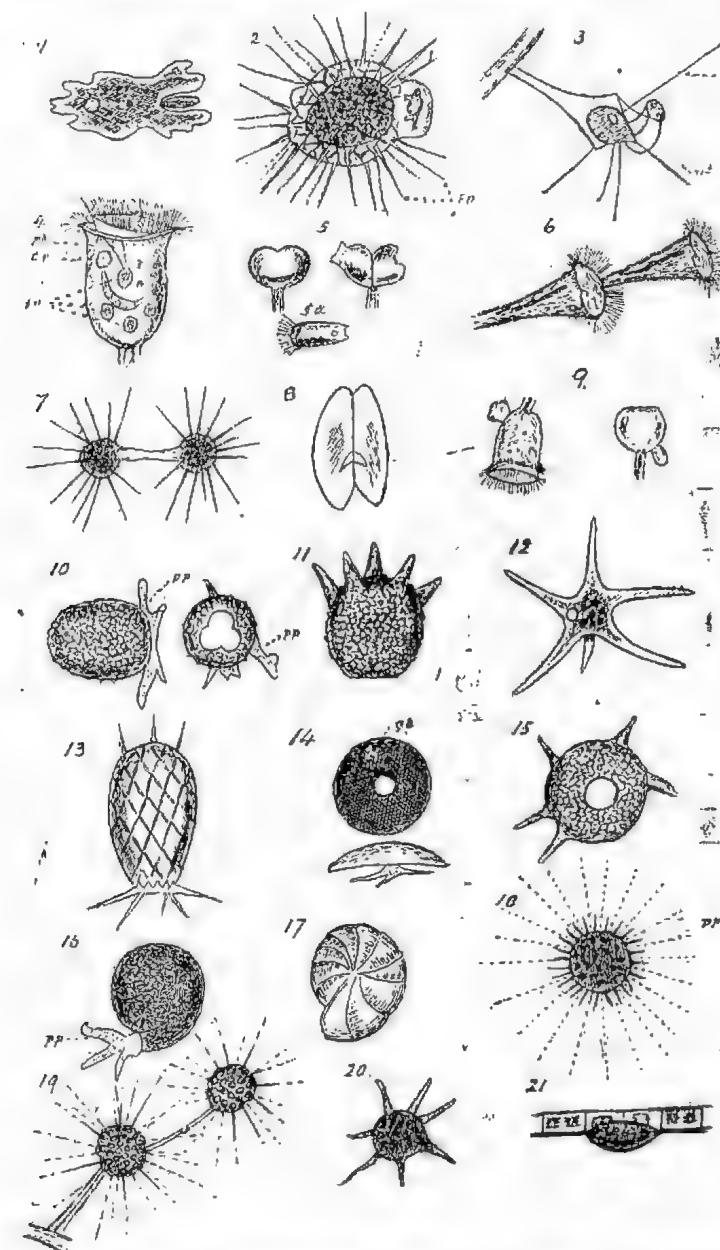
A most interesting subdivision of the sub-class Actinopoda is the Heliozoa, or sun animals, so called from their resemblance to the conventional representation of the great luminary. This order is divided into four sub-orders, based upon the absence of or character of the enclosing envelope. Three of these sub-orders have been represented in our captures. The sub-order Aphrothoraca comprises those forms in which a hardened cortex is practically non-existent. Of those, one of the best known is *Actinosphaerium eichornii*, Ehr. This is a comparatively large protozoon. It has some characteristics by which it can be easily identified; in the first place, the cytoplasm is extremely vacuolar, bearing some resemblance to a sphere of tiny soap-bubbles. Another peculiarity is the very large number of nuclei present; as many as 300 have been found in an old specimen. Extending outward from the surface

of the body are numerous ray-like pseudopodia which are stiffened by "axial rods," but which are not by any means made rigid thereby, as is evidenced by the way in which they capture and ingest food, as referred to earlier.

Actinophrys sol, Ehr., has some resemblance to *Actinosphaerium*, but is considerably smaller. *Actinophrys* has not the extremely vacuolar character of the other, neither is it multinucleate, and an extremely large contractile vesicle generally develops, bulging out the cortex in a marked manner before bursting.

Of the second sub-order of Heliozoa, *Chlamydophora*, it has not been our good fortune to find a representative. The third sub-order, *Chalarothoraca*, comprises forms which possess an investment of scales placed tangentially, and also silicious spines or spicules extending radially from the whole surface. Of this group we have taken two or three species of the genus *Acanthocystis*, Carter. Between the spines on the surface long granular pseudopodia are extended, which resemble strings of beads. In many cases a symbiotic green organism is found in numbers within the cytoplasm. These green bodies are not an integral part of the animal. Their presence furnishes an example of symbiosis, or the living together of two organisms for mutual benefit, which is not an uncommon occurrence amongst Protozoa. The green granules are chlorophyll contained within numerous plants known as *Zoochlorellæ*. The plants, when not living symbiotically, are flagellate organisms, *Chlorella vulgaris*, allied to *Protococcus*. On obtaining entrance into an animal they lose their flagella and live within the host on the best of terms. The mutual benefit is of this nature: during the processes of metabolism in the cell—that is, the breaking down and building up of the cell substance through its activities—carbon dioxide is produced; this suits the requirements of the plant inhabitants excellently. By the aid of their chlorophyll they break up the CO_2 , absorb the carbon, thus setting free the oxygen to be used in the oxygenation of animal cell. How these plants escape digestion is an interesting question.

The fourth subdivision, *Desmothoraca*, furnishes the very beautiful form *Clathrulina elegans*, Cienk. This animal secretes a spherical, chitinous test, perforated by numerous holes, which give it a decidedly lattice-like appearance. The test is attached to some medium of support by a lengthy peduncle. Long pseudopodia are extended through the holes in the test. On dividing the young animals frequently attach themselves to the test of the parent, thus forming colonies. Very fine examples of this Protozoan may be had in our Botanic Garden lake.



cv Contractile vacuole; fv Food vacuole; ph Pharynx; pp Pseudopodia; gb Gas bubble.

Protozoa, with the exception of figures 3, 4, 5, 6, 8, 9, illustrating the Class Sarcodina. Much enlarged.

A form the position of which as regards its classification is somewhat doubtful is *Vampyrella laterita*, Leidy. It may be classed either with the Rhizopoda or Heliozoa, to both of which it bears a resemblance when assuming different forms. It received the name *V. spirogyra*, as it was erroneously supposed to live on the alga Spirogyra. I have, however, seen the animal feeding on Zygnea, another filamentous alga. When not feeding it is somewhat star-shaped in form. On coming into contact with a food plant of the sort mentioned it settles down upon it a shapeless mass, and after a time succeeds in penetrating the cell wall and devours the cell contents.

EXPLANATION OF PLATE.

		Approximate size of animal.
1.—	Ameba about to ingest a diatom	—
2.—	<i>Actinosphaerium eichorniae</i> ingesting a rotifer	dia., 50 to 300 μ
3.—	Acineta, sp., sucking out contents of an infusorian	—
4.—	Formation of food vacuoles in Vorticella	—
5.—	Longitudinal fission in Vorticella; 5 μ separated zooid	—
6.—	Transverse fission in Stentor	—
7.—	Fission in <i>Actinophrys sol</i>	50 μ . (body part).
8.—	Conjugation in <i>Paramoecium aurelia</i> —isogamy	—
9.—	Conjugation in Vorticella—anisogamy	—
10.—	<i>Diffugia lobostoma</i>	300 μ . length
11.—	<i>D. corona</i>	180 μ . length
12.—	<i>Dactylosphaerium (Ameba) radiosum</i>	30 μ . (body only)
13.—	Euglypha, sp.	—
14.—	<i>Arcella discoides</i> , with contained gas bubble	150 μ .
15.—	<i>Centropyxis aculeata</i>	125 μ .
16.—	<i>Lesquerellia spiralis</i>	100 μ .
17.—	Test of <i>Polystomella crispa</i>	—
18.—	<i>Acanthocystis erinaceus</i>	16 μ .
19.—	<i>Clathrulina elegans</i>	80 μ .
20.—	<i>Vampyrella laterita</i> , Heliozoan form, not feeding	40 μ .
21.—	Same, feeding	—

NOTE.—The measurements, which are given in micro-millimetres, may be altered to approximate fractions of an inch if desired by using the number of micra as the numerator of a fraction with 25,000 as denominator.

ON A THALASSOID ELEMENT IN THE AUSTRALIAN MOLLUSCAN FAUNA.

BY CHARLES HEDLEY, Australian Museum, Sydney.

(Communicated by CHAS. OKE.)

(Read before the Field Naturalists' Club of Victoria, 14th May, 1923.)

In certain inland waters of other continents occur animals of marine affinities which are quite distinct from the ordinary fluviatile types. Such have been carefully examined in the African Lake Tanganyika, where zoologists were astonished at the appearance of jelly-fish, prawns, crabs, and of odd shells of a marine pattern.* For this assemblage, Bourguignat, an early worker in this field, proposed † the useful term "thalassoid," approved by Von Martens and E. A. Smith.‡

No one, so far as I know, has yet noticed the existence in Australia of a thalassoid fauna. With the hope that other naturalists will develop further this interesting subject, I now announce the molluscan genus *Coxiella* to be a true thalassoid.

Coxiella is a genus of operculate gasteropods, confined to Australia and Tasmania; related to a marine genus, *Truncatella*, for which, indeed, it was at first mistaken, but differing from that by a concentric operculum; it dwells in saline pools, which are sometimes saltier than the sea; has its focus of distribution in Western Australia, whence the genus migrated east through South Australia and Victoria to Tasmania, and is probably of a high antiquity. Future research may perhaps distinguish physiological features to correspond with the unusual environment.

The story of the discovery of the first *Coxiella* has been missed both by local writers and by conchologists abroad. It is as follows:—During his exploration of Australia Felix, Sir Thomas Mitchell reached a saline lake, which he named Mitre Lake, under Mount Arapiles, more than a hundred miles distant from the sea, and near the present western boundary of Victoria. Here Mitchell observed that, in association with the maritime herb, *Salicornia*, "Along the water's edge a very minute shell had been thrown up in considerable quantities by the waves." This shell from Mitre Lake was referred to James De Carle Sowerby, who named it *Truncatella filosa*. Sowerby left unfulfilled a promise to publish a fuller account of the new species in a scientific serial, but four years afterwards he gave a good figure of it under the changed name of *Truncatella striata*.

Mitchell's account of the disposition of the species was con-

* Moore, *Nature*, July, 1897, pp. 198–200.

† Bull. Soc. Malac., France, iii., 1886, p. 143.

‡ Proc. Zool. Soc., 1906, i., p. 181.

firmed by Dr. J. E. Taylor ("Our Island Continent," 1886, p. 162), who, describing the source of some of Smith's co-types of *Coxiella confusa*, wrote:—"Along the banks" [of the brackish Lake Corangamite] "are layers of small shells, which the wind heaps and piles up in singular-looking drift lines."

The present writer also once saw this *Coxiella* as a pure formation of millions of shells packed in wind-rows on the beach of the bitter waters of the crater-lake Bullen-Merri, near Camperdown, Victoria.

Under the erroneous generic and specific names of "*Blanfordia striatula*," Angas recorded *C. filosa* from the neighbourhood of Adelaide and from Tasmania. Afterwards it was thus figured and described by Cox from South Australia, Victoria, and Tasmania. Then Johnston proposed the name of *Potamnopis hadgerensis* for a fossil form of *C. filosa* from the islands of Bass Strait. When E. A. Smith learned that Cox had exchanged identities of an eastern and a western species, and thus misused Menke's name, he unfortunately overlooked those names supplied by Sowerby and Johnston, and proceeded to substitute the singularly appropriate specific "*confusa*" for *striatula*, Cox, not Menke.

Pfeiffer was once (1857) inclined to unite Sowerby's *striata* to Menke's *striatula*, but the figures of Kuster and of Reeve show how distinct they are. *C. striatula* increases more rapidly in breadth, and is imperforate; besides, if Smith were correct in uniting *Blanfordia pyrrhostoma*, Cox, to *Truncatella striatula*, Menke, the western form attains a much larger size—namely, a length of 18 mm. and a breadth of 7 mm. in six remaining whorls.

Because the literature relating to this eastern *Coxiella* is scattered, and unknown to modern writers, the following index of it is now presented:—

- 1838.—*Truncatella filosa*, J. De C. Sowerby, in Mitchell, "Three Expeditions," &c., ii., p. 190.
- 1842.—*Truncatella striata*, J. De C. Sowerby, in Reeve, Conch. Syst., ii., p. 94, pl. 182, fig. 4.
- 1845.—*Truncatella striata*, Catlow and Reeve, "Conchologists' Nomenclator," p. 169.
- 1846.—*Truncatella striata*, Pfeiffer, Zeitsch. f. Malak., iii., p. 190.
- 1855.—*Truncatella striata*, Küster, Conch. Cab. Bd. i., abth. 23, p. 16.
- 1856.—*Truncatella striata*, H. and A. Adams, Genera Recent Moll., ii., p. 311.
- 1857.—*Truncatella striata*, Pfeiffer, Brit. Mus. Cat. Auriculidae, p. 143.

1858.—*Trunivatella striata*, Pfeiffer, Mon. Pneum. Viv., iii., p. 9.

1864.—*Blanfordia striatula*, Angas, Proc. Zool. Soc., 1863, p. 523.

1864.—*Blanfordia striatula*, Cox, Cat. Austr. Land Shells, p. 40.

1868.—*Blanfordia striatula*, Cox, Monogr. Austr. Land Shells, p. 95, pl. 15, fig. 13, a, b, c.

1876.—*Pomatiopsis striatula*, Ten.-Woods, Proc. Roy. Soc. Tasm., 1875, p. 78.

1879.—*Pomatiopsis badgerensis*, Johnston, Proc. Roy. Soc. Tasm., 1878, p. 26.

1888.—*Pomatiopsis badgerensis*, Johnston, Geol. Tasm., pp. 322, 329, 330.

1893.—*Pomatiopsis striatula*, Adcock, Hand-list Aquatic Moll., S.A., p. 7.

1894.—*Blanfordia striatula*, Tate, Trans. Roy. Soc. S.A., xviii., p. 196.

1894.—*Coxiella striatula* (in part), Smith, Proc. Malac. Soc., i., p. 98.

1896.—*Pomatiopsis striatula*, Mulder, Geelong Naturalist, v., part 4, p. 8.

1898.—*Coxiella confusa*, Smith, Proc. Malac. Soc., iii., p. 76.

1900.—*Pomatiopsis striatula*, Lodder, Proc. Roy. Soc. Tasm., 1899, p. 138.

1901.—*Coxiella confusa*, Tate and May, Proc. Linn. Soc. N.S.W., xxvi., pp. 390, 449.

1904.—*Coxiella badgerensis*, Hedley, Proc. Linn. Soc. N.S.W., xxix., p. 183.

1905.—*Coxiella confusa*, Gathiff, Victorian Naturalist, xxii., p. 14.

1919.—*Coxiella striatula* (in part), Chapman, Proc. Roy. Soc. Vict., xxxii., p. 25, pl. iii., fig. 3.

1921.—*Coxiella badgerensis*, May, Check-list Moll. Tasmania, p. 57.

A GIPPSLAND BEAUTY SPOT.

CAN IT BE RESERVED AS A "NATURAL SANCTUARY"?

DEAD-COCK Creek has recently come into notice owing to the suggestion that it should be permanently reserved as a beauty spot. It is a western tributary of the Mitchell River, the junction being a few miles from Lindenow and some twenty-five miles above Bairnsdale. Nearly fifty years ago the late Mr. A. W. Howitt, F.G.S., made a canoe trip down the Mitchell River in order to carry out some geological investigations among the Iguana Creek beds along its course.

It was a hot summer day, with terrific bush-fires raging among the mountains far and near; the country was shrouded in a cloud of smoke, particles of charred leaves floated

about, and the heat was stifling when Howitt, with his two aboriginal companions, had paddled and scrambled down the river to where the ravines of Bull Creek and Dead-Cock Creek join the deep valley of the Mitchell, only a few chains apart.

We are not at the moment concerned with his conclusions as to the Iguana Creek beds, but his account of Dead-Cock Creek and his sketch of the "Ngrung a narguna," as they were printed in Report No. III. (1876) of the Geological Survey of Victoria, deserve to be republished for the present generation:—

"This was Dead-Cock Creek, and I determined, as we had only one canoe, to here leave the river and make to where the track crossed coming down from Tabberabbera. Here I waited for an hour, bathed in the delightfully soft, refreshing water, and had a second breakfast in the shady, rock-bound mouth of the creek, which was now dry, excepting some pools in the rocky floor. Then, being refreshed, we rolled up our things, left the canoe for the 'marris' (ghosts), as 'Bungil Bottle' expressed it, and marched up the bed of Dead-Cock Creek.

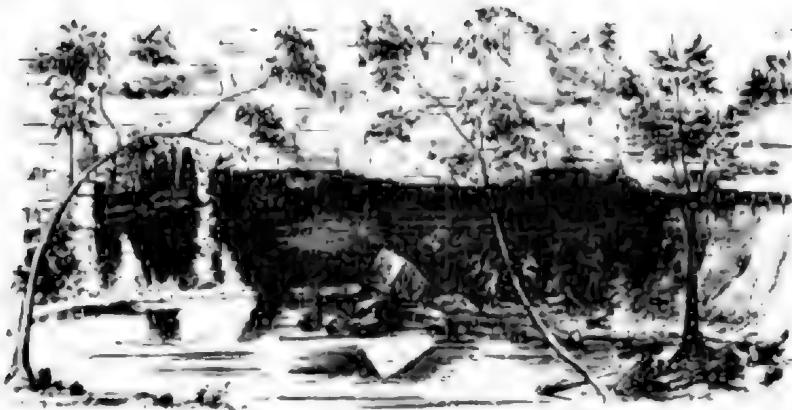
"It was now past noon, and in the deep river valley, among the rocks and boulders, the heat had been intolerable, for, to improve matters, we had now got down among the fires, which we could hear roaring high up above us on the summit of the cliffs. Volumes of smoke eddied across the valley, and the constantly-recurring crash of falling trees told us what was going on far up above the deep chasm of Dead-Cock Creek.

"What a contrast! We were walking along the almost horizontal surface of the Iguana Creek beds, swept clean by the spring floods. The chasm was not more than forty feet in width, and was completely shaded by huge Acmenias (Eugenias), Pittosporums, and Lightwoods, with a few giant gum-trees. Their massive boles and mouldering logs were covered by Polypodia and other small ferns, and on either side rose the steep hillsides, clothed with tall grass and shaded by large Stringybark and other gum-trees or else sheer precipices of rock. All the birds of the country appeared to have taken refuge in these cool recesses from the fiery furnace of the outside world.

"After slowly picking my way along the rocky floor of the creek for perhaps a mile, admiring the beauty of the scene, and occasionally drinking from the rock-pools of 'nice cool la-en yarn' (water), as 'Turnmile' phrased it, we came to a picturesque cavern formed by the wearing away of the soft beds from underneath a hard course of grit. It extended in a semicircular form across the creek, the roof of the cave being the ledge over which the water falls during rainy times. The blackfellows were delighted with this 'house,' and planned to themselves how they could come and camp here and collect

the tails of the 'Woorayl' (Lyre-bird) among the scrubs of the river and feast on the native bears and wallabies, poor unsuspecting creatures of the neighbourhood. Here we had to climb up the cliffs at the side by a wallaby track to get out, but, being once again in the creek-bed, there were the same pleasant shades as before. A little further on we came to a second cave, a wonderfully picturesque and beautiful spot.

"As before, a soft bed of reddish shale has been worn away by the backwash of waters falling over a hard ledge, but here the cave was higher and deeper. In front was a pool of water looking black and smooth as glass under the shade of the 'Lilly-pillies' (*Eugenia*). Stalactites fringed the rim of the cavern and hung in pendent rows from its roof. A huge stalactitic mass at one side joined the roof to the floor so as to screen the cavern partly, and on either hand the rocks rose up almost perpendicularly for, I think, not less than 400 or 500 feet. Two Lyre-birds which were disporting themselves in the cavern almost delayed their departure too long. 'Bungil Bottle' narrowly missed one with a lump of wood, which he threw as quick as lightning, and Master Turnmile, being very excited, was in the act of throwing my new tomahawk at the other among the rocks when I stopped him. I preferred my new tomahawk to a dead Lyre-bird, but my aboriginal seemed not to see it in the same light.



"While I made a light sketch (No. 21, reproduced above) and examined the rocks, the two blackfellows looked round the cave with many wondering exclamations of 'Ko-ki' at the stalactites, two of which they carried off as wonderful objects to show their friends. I was amused listening to them conversing in the mouth of the cavern. Master Turnmile, 'the dandy,' thought it would be a splendid place to run off to with

one of the aboriginal young damsels a house ready provided, plenty of wallabies and native bears, and a country unknown to the other blackfellows. 'Bungil Bottle,' on his part, was impressed vividly by the belief that this was indeed the haunt of the mysterious creature the 'nargun'—the 'ngrung a narguna' (den of the nargun).

"The nargun, according to their belief, is a mysterious creature, a cave-dweller, which haunts various places of the bush. So far as I could learn, the blacks believe the nargun haunts especially the Mitchell valley, which we had just followed from Tabberaberra. What is the appearance of a nargun they cannot describe, excepting that it is like a rock ('wallung'), and is said to be all stone except the breast and the arms and the hands. They say it inhabits caverns, into which it drags unwary passers-by. If you throw a spear or fire at it with a bullet, they say the spear or bullet will turn back on you and wound you. There is a cave in the Miocene limestones of Lake Tyers which is said to be inhabited by a nargun, with which one of the natives, 'Dan's mother,' according to report, had a fight. This is all I could learn.

"The rocks at the 'nargun's cave' I found to be the usual alternations of sandstones and grits with pebble conglomerates, and here, as in the typical locality near Iguana Creek, were thick beds of soft reddish rock, apparently devoid of stratification and evidently calcareous, judging from the stalactites which depended from the roofs and sides. From the 'ngrung a narguna' we found it no easy matter to escape. The ledge which formed the roof was some 30 feet above where we stood, and overhung the deep pool, except in one corner, at which a narrow ledge gave entrance to the cavern. The rocks on either hand rose up almost perpendicularly, far up above the tops of the trees in jutting sandstone ledges. The only plan seemed to be to go back down the creek and climb up the mountain-sides.

"At last I got the two blackfellows to fall a tall, straight, young tree, and after much struggling we got it reared up at the corner of the roof. 'Bungil Bottle' cut foot notches with his tomahawk, and ascended as easily as going up stairs. I followed without my boots, and, long before I had walked up the notches of these 30 feet of height, heartily wished, for once, that my feet had been as hard and horny in the soles as those of my black attendants. The roof of the cavern was another succession of sandstone beds, nearly horizontal, and forming, as it were, broad steps up the creek. But the trees were now not so high, and the sides of the glen widened out into a gully.

"The heat and smoke were excessive after coming from among the cool shades below. A mile or two more and we were in the

forest country. The fires were raging furiously, in some cases having only just passed ; and where we struck the Tabberabbera track the conflagration was roaring up the opposite hillsides in dense volumes of fire and smoke. The scrubs were crackling and detonating like a fusillade. In a little green oasis which had escaped the flame we rested, and the blackfellows talked to each other of the sight they had seen, and then counted the number of native bears ('goola') which had taken refuge in the trees about and piteously looked round on the fiery desolation. Seven miles' tramp through the smouldering forests, and a ride of twenty, took me back to Bairnsdale that night."

On two occasions I have had the opportunity of camping in the cave so much admired by " Turnmile," and would like to briefly supplement Howitt's interesting description. The two creeks, in their deep, shut-in gorges, possess, in many respects, a unique flora, but reminiscent in part of distant Croajingolong, and their environment is very unlike anything in Victoria that I have seen. Even the so-called 'Gippsland crocodile,' the water-lizard, *Physignathus lesuerii*, Gray, var. *Howitti*, M'Coy, frequents its pools and the near-by river.

There are three big trees growing along the beds of these creeks — *Eugenia Smilhii* (Lilly-pilly), *Pittosporum undulatum*, and, commonest of all, though not mentioned by Howitt, *Tristania laurina* (Kanooka). To say that they thrive in these sheltered, shady ravines is to underestimate the truth, for, while elsewhere I have rarely seen them more than a foot in diameter, here specimens of all three were found twelve to fifteen feet in girth and fifty to a hundred feet in height. No eucalypts grow at the bottom of the gorges, but, perched part way up, and often overhanging the edges of the cliff-like walls, we found many fine specimens of *Sterculia diversifolia* (Currajong). One of these was a giant, and measured over fifteen feet in girth. An occasional Currajong was mixed with the Messmates and Stringybarks of the table-land above, the only part of Victoria (except in the far north, near the Murray River) in which I have seen it in its native state.

The eucalypts of the district are rapidly disappearing as the result of periodical bush-fires, but in the sheltered ravines no fire has apparently penetrated since Howitt was there a half-century ago, and the luxuriant vegetation which so delighted him still remains as a legacy to Victoria.

We saw no sassafras or beech, but ferns, musk, and similar gully shrubs are abundant, and some half-dozen creepers and vines, such as *Tecoma*, *Clematis*, and *Smilax*, have festooned their rope-like stems from the trees overhanging the creek.

On a four-day visit recently we heard or saw over thirty varieties of birds, including the Lyre-bird, the Wonga Pigeon,

the Bower-bird, and, of course, the Bell-birds, which kept up a tinkling orchestra at the pool in front of our cave.

Scarce a quarter-mile away, the Bull Creek ravine is very similar, with even more luxuriant growth, but with not quite such precipitous walls as Dead-Cock Creek. How these creeks got these names I do not know, but they certainly deserve more pleasing titles. It would be a pity if advancing civilization (!) were to be allowed to destroy this unique and natural sanctuary for the native flora and fauna that has for so long survived in the ravines of these two creeks.—HEBER GREEN.

[In a paper entitled "Bird-life on the Upper Mitchell," by Mr. F. J. Thomas, read before the Field Naturalists' Club on 15th January, 1912 (vol. xxviii., p. 199), the author gave some account of a visit to the Dead-Cock and Bull Creek gorges. He paid special attention to the birds of the locality, and gives a list of forty-seven birds as having been observed by him. He regarded the Sanguineous Honey-eater, Bell Miner, Rufous Fan-tail, and Wonga Pigeon as the most noteworthy seen.—ED. Vict. Nat.]

BOOK NOTICE.

AN ELEMENTARY TEXT-BOOK OF AUSTRALIAN FOREST BOTANY.

By C. T. White, F.L.S., Government Botanist of Queensland. Published under the direction of the Forestry Commissioners of New South Wales. Sydney: J. Spence, Acting Government Printer. 1922. 223 pp., 8 x 4½ in.

This is the first volume of a work which has been designed for the use of forest officers and students of forestry. It is divided into three sections—morphology, anatomy, and physiology—occupying sixteen chapters. Each chapter is very complete, all technical terms used are fully explained, and in most cases accompanied by illustrations taken from Australian plants or trees. Particular attention has been paid to the derivations of words used, so that it becomes almost a botanical dictionary. The illustrations, mostly included in the text, are particularly clear, and should be easily understood. An excellent index, occupying fifteen pages, is an outstanding feature of the work. A second volume is promised, which is to be largely devoted to systematic botany and Australian plant associations, more particularly the various forest types and their characteristics, such as the structure of timbers and their identification. As a foundation for gaining a knowledge of botany the volume under notice seems admirably planned. We congratulate Mr. White on his production, and look forward with great interest to the appearance of the second volume. The work is obtainable through the booksellers at eight shillings and sixpence.

VICTORIAN EUCALYPTS.—In Part LIX. of "A Critical Revision of the Genus *Eucalyptus*," issued last month, Mr. Maiden continues to deal with the inflorescence of the genus, and submits "an improved tentative classification" (antherecii). According to this the Victorian species would be ranged somewhat as follows:—

(A) *Renantheræ*.—Anthers kidney-shaped, the lobes eventually becoming "confluent" (to use Bentham's term). The gland medium-sized, and visible from the front. All eastern and Tasmanian.

amygdalina.	obliqua.	Muelleriana.
*australiana.	gigantea.	piperita.
dives.	*fastigata.	pilularis.
radiata.	capitellata.	Sieberiana.
numerosa.	Blaxlandii.	stricta.
regnans.	macrorrhyncha.	haemastoma.
vitrea.	Consideiana.	Smithii.
coriacea.	eugeniooides.	Mitchelliana.
stellulata.	ligustrina.	diversifolia.

(a) Sub-section *Alpinæ*.—Anthers very large, lobes longer, opening more widely.

alpina.

(B) *Renantheroides*.—Anther lobes divergent or sometimes nearly parallel.
diversifolia.

(C) *Porantheroideæ*.—Anthers small, globular, glands at top, filaments inserted at the base or nearly. Eastern.

hemiphloia.	odorata.
microcarpa.	Bosistoana.
*Woollsiana.	Behriana.
albens.	polybractea (fruticetorum).
bicolor.	acacioides (viridis).

(D) Terminales.—Anthers with terminal pores, erect or oblique on filament.

Baueriana.	leucoxylon.	Blackburniana.
melliodora.	sideroxylon.	uncinata.
polyanthemos.	paniculata.	leptophylla.

(E) *Platyantheræ*.—Anthers broad, thick, white; lobes parallel, or nearly; gland on top or top of gland visible from the front; filament at base.

oleosa." *transcontinentalis*. *Flocktonia*.
(a) Sub-section *Graciles*. — "Very large white anthers, opening obliquely, filament at base, gland small or absent, cells widely opened, with parallel slits."
gracilis *calycogonoides*.

* Not admitted by Mr. Maiden.

(F) *Macrantheræ*.—Anther lobes opening in parallel slits, top of gland sometimes showing from the front. Filament inserted at base of gland.

(a) *Tereticornes*.

<i>tereticornis</i> .	<i>Perriniana</i> .	<i>botryoides</i> .
<i>rostrata</i> .	<i>Kitsoniana</i> .	<i>elaeophora</i> .
<i>viminalis</i> .	<i>cladocalyx</i> .	<i>longifolia</i> .
<i>rubida</i> .	<i>globulus</i> .	<i>Stuartiana</i> .
<i>maculosa</i> .	<i>Maideni</i> .	* <i>Bridgesiana</i> .
<i>ovata</i> .	<i>goniocalyx</i> .	<i>Studleyensis</i> .
* <i>camphora</i> .	<i>nitens</i> .	<i>incrassata</i> .
<i>Yarraensis</i> .	<i>cineræa</i> .	<i>dumosa</i> .
<i>Gunnii</i> .	<i>neglecta</i> .	<i>angulosa</i> .

(b) *Longiores*.—Anthers long and narrow.
corymbosa. maculata.

Part LX. of the "Critical Revision," which closely followed the preceding number, deals with the fruits—their size and shape, the capsule in its relation to the calyx tube, its valves, and the rim.—C. S. SUTTON.

FOR several weeks the Tasmanian Crimson Berry has been retailed in large quantities by the flower-sellers of Melbourne. This is a shrubby Epacrid, *Cyathodes acerosa*, R. Br. (*Styphelia oxycedrus*, F. v. M.), which grows in considerable quantities in the hilly portions of Tasmania. It is to be hoped that the fact of its having attracted public favour will not lead to its extermination. It is also a native of Victoria, having been recorded from Mt. Hunter, in the National Park, Wilson's Promontory, and is recorded from New Zealand.

ADDITIONS AND CORRECTIONS TO LIST OF MEMBERS
IN JULY NATURALIST.

May 1911 Firth, J., Box 79, Mildura	...	...	Forestry
May 1919 Goudie, J. C., Boundary-road, Maldon	...	...	Ent. (Col.)
Mar. 1923 Lathami, A. T., 26 Scott-street, St. Kilda			
Mar. 1923 Lewis, A. N., "Wallington," Hotham-street, East Melbourne	...	...	Geology
Mar. 1923 Miller, V., 10 Lambeth-place, St. Kilda			
May 1923 Parr, Walter J., 18 Bokhara-road, Caulfield	...	...	Palaeontology
July 1922 Williamson, A. J., Bank of Victoria, Dunolly			

* Not admitted by Mr. Maiden.

The Victorian Naturalist.

VOL. XL.—No. 5. SEPTEMBER 6, 1923.

No. 477.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 13th August, 1923.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about sixty members and visitors were present.

CORRESPONDENCE.

From Assoc.-Prof. A. C. Rivett, M.A., D.Sc., hon. sec. Australian National Research Council, calling attention to a public meeting in connection with the Pan-Pacific Science Congress to be held in the Assembly Hall, Collins-street, on Thursday evening, 16th August, during which it was proposed to hold a discussion on the preservation of the Australian fauna, and inviting members of the Club to be present.

From Mr. H. A. Howard, hon. sec. Canterbury Horticultural Society, inviting members of the Club to be present at the planting of trees in Beckett Park, Balwyn, by Their Excellencies Lord and Lady Forster on Saturday afternoon, 20th October.

ELECTION OF MEMBER.

On a ballot being taken, Miss F. Jude, 13 Dickens-street, St. Kilda, was duly elected an ordinary member of the Club.

REPORT.

A report of the visit to the National Museum on Saturday, 21st July, was, in the absence of the leader, Mr. J. A. Kershaw, F.E.S., given by Mr. F. Pitcher, who said that a large party of members had attended. Some time was spent in the several halls of the Museum, where recent additions, &c., were pointed out; then the "H. E. White Collection" of bird-skins and the entomological collections were inspected and explained.

GENERAL BUSINESS.

Mr. F. G. A. Barnard stated that a deputation of persons interested in the preservation of the vegetation in the higher altitudes of the State would wait upon the Minister of Forests on Wednesday, 15th inst., and asked any members interested to try and be present at the interview.

The hon. sec., Mr. C. Oke, reported that he had interviewed Mr. F. Lewis, Chief Inspector of the Fisheries and Game Department, with regard to the appointment of a fish culturalist, and moved—"That in the opinion of this Club it is desirable that the State Government should appoint a fish culturalist to conduct experiments in breeding certain of the indigenous fishes with the view of stocking some of the depleted streams of the State, and that letters to that effect be forwarded to the

Chief Secretary and the Treasurer." This was seconded by Mr. E. Cox, and carried unanimously.

The chairman called attention to the date fixed for the annual exhibition of wild-flowers—viz., Wednesday, 3rd October, and urged members to use every effort to make the exhibition a success. It would be held in the Melbourne Town Hall, and offers of assistance on the day by both ladies and gentlemen would be welcomed by the committee.

Mr. F. Pitcher asked if any decision had been come to regarding the disposal of the profits of the exhibition, and, on being informed that the matter had not yet been considered, moved that half the net proceeds be handed over to the Victorian Bush Nursing Association. He said that, as the Club depended so much on country people for the success of its wild-flower exhibitions, he thought it would be a nice spirit to help them in return. The resolution was seconded by Mr. H. B. Williamson, F.L.S., and supported by Miss Rose Currie.

On being put to the meeting the motion was carried unanimously.

The chairman said that Mr. V. Miller had placed a number of collecting tubes at the disposal of members, which could be obtained at the close of the meeting.

PAPER READ.

By Dr. C. S. Sutton, B.S., entitled "The Vegetation of Cradle Mountain, Tasmania."

The author, by means of an excellent series of lantern slides of the district, and of individual trees and plants, gave an interesting account of the plant life of the district, which is the most elevated portion of Tasmania, ranging up to slightly over 5,000 feet above sea-level. The scenery of the district is very striking, being of volcanic character, with numerous almost inaccessible hillsides, and the vegetation contains many species of more than passing interest. [One of the Proteaceæ met with, *Bellendena montana*, R. Br., is illustrated in this issue.—ED. Vict. Nat.]

An interesting discussion followed, in which Messrs. G. Coghill, A. N. Lewis, P. R. H. St. John, E. E. Pescott, F. G. A. Barnard, F. Pitcher, A. E. Keep, and the chairman took part. Mr. St. John said that the liliaceous plant *Blandfordia marginata*, Herb., "Christmas Bells," had been successfully grown at the Melbourne Botanic Gardens. Mr. Lewis said that in his garden at Hobart he had grown a number of the typical plants of the district, but, owing to the heavy rainfall to which they were accustomed in their native home, they required special attention as regards watering, not recovering from the slightest neglect in that respect.

In answer to questions, the author said that the pines

PLATE V.



MOUNTAIN ROCKET, *B. montana*, R. Br.

Photo, C. S. SUTTON.

mentioned were indigenous to Tasmania. He had grown several plants from the district at his home in Carlton. Coal had been found near Barn Bluff, and the tracks generally were not difficult.

EXHIBITS.

By Mr. F. G. A. Barnard.—Flowering branches of *Acacia elongata*. Long-podded Wattle, grown at Kew. Similar specimens were exhibited last month, showing the long flowering period of this species.

By Mr. A. E. Rodda, on behalf of Geological Survey of Victoria.—Phosphate rocks from Mansfield (Victoria), Algeria, Curaçoa, and Aruba Island, South America.

By Dr. C. S. Sutton.—Herbarium specimens and photographs in illustration of paper.

After the usual conversation the meeting terminated.

TASMANIAN PROTEACEÆ.—The Proteaceæ are one of the most ancient and most natural groups of plants. Generally speaking, it is characterized by the stability of its members, few of them showing much variation; yet the not very distant and comparatively recent isolation of Tasmania from the mainland has resulted in the development there of some very interesting forms. As compared with Victoria, which has 10 genera and 54 species, only 5 of which are endemic, the island possesses 11 genera (3 endemic) and 22 species, half of which are peculiar to it. Only *Persoonia juniperina*, *Grevillea australis*, *Banksia marginata*, *B. serrata*, and six Hakeas are common to both, and all of these are mainly confined to the lowlands. *Isopogon eratophyllum* and *Hakea ulicina* do not extend beyond the islands of the Strait, and *Conospermum taxifolium* has skipped these and ranges from the east coast of New South Wales down to the same side of Tasmania. Of the endemic species, all except *Lomatia tinctoria*, a handsome shrub of three to five feet, with long, spreading racemes of creamy-white flowers, are montane, and more or less confined to the southern and western parts. *Agastachys*, *Cenarrhenes*, *Telopea*, *Persoonia Gunnii*, and *Lomatia polymorpha* are sylvan, and grow to tall shrubs or small trees. The four Orites, common on most mountains between 3,000 and 4,000 feet, where, like our own single species, *O. lancifolia*, they seem altogether out of place, are extremely sclerophyllous, with thick, cylindrical or tightly revolute leaves and insignificant flowers. The most attractive species in the island—a picture of which is here given—is the Mountain Rocket, *Bellendena montana*, which shows its beautiful cone-shaped inflorescence of pink-tipped buds and creamy flowers from elevations of about 2,500 feet to the tops of the highest plateaux.

A TRIP TO THE BOGONG HIGH PLAINS.

BY H. B. WILLIAMSON, F.L.S.

(Read before the Field Naturalists' Club of Victoria, 12th Mar., 1923.)

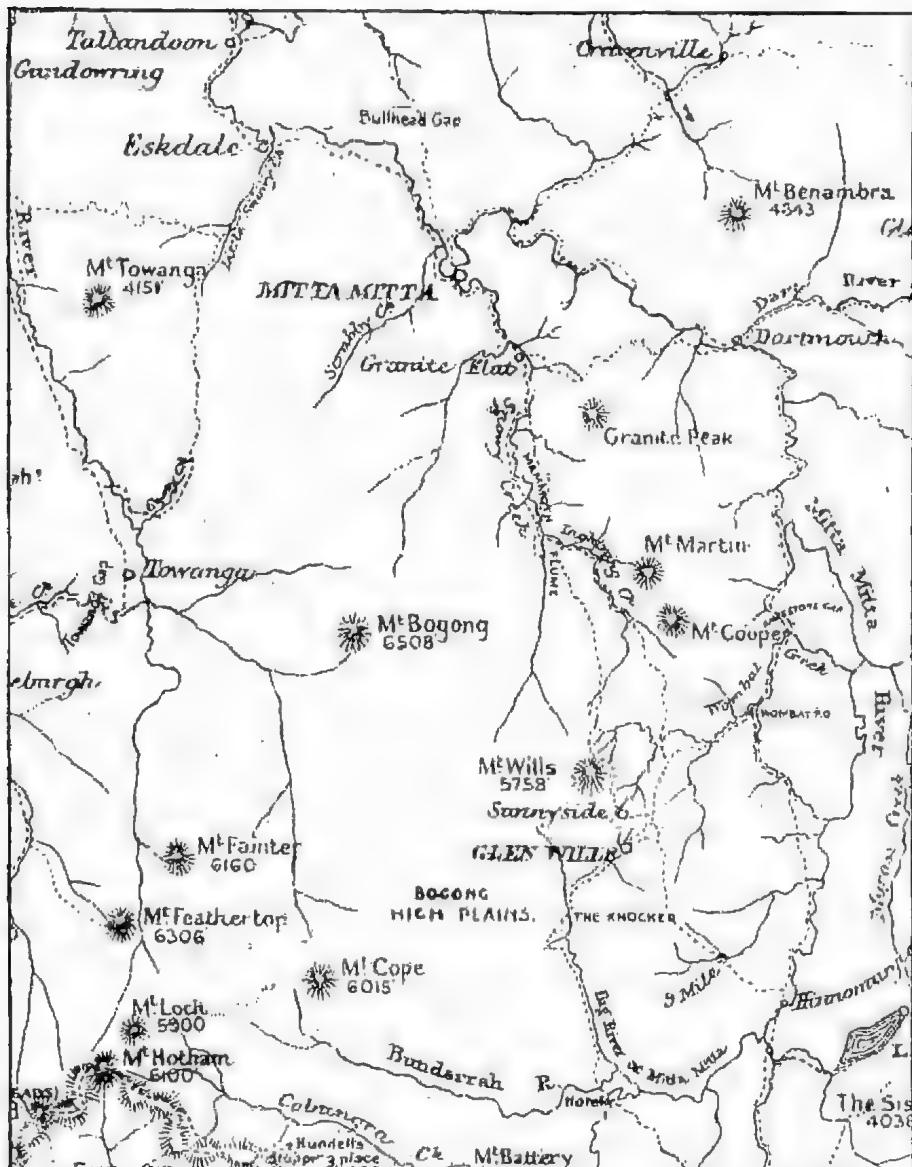
This interesting upland region, situated in the north-eastern portion of the State, is distant about 250 miles from Melbourne. It can be reached from Omeo via Bruthen, but the route from Mitta Mitta via Tallangatta was chosen by me owing to the presence at Mitta Mitta of Mr. S. F. Clinton, who had been in charge of the Mitta Mitta State school for some years, and who was spending his holidays there. Mr. Clinton is known throughout that district as an expert bushman, an enthusiastic mountain-climber, and a botanical collector.

Arriving at Mitta Mitta on 29th December last from Tallangatta, a 40-mile trip by car, I found my friend there. He had made arrangements with a guide, Mr. H. Downes, of Eskdale, to provide horses—one for the pack and one for myself—and, after being delayed a day by heavy rain, we rode on the 31st to Glen Wills, arriving there late in the evening. Our destination was a wayside homestead, where we were very hospitably entertained for the night. Mrs. Prendergast, our hostess, lives a mile or two on the Omeo side of Glen Wills, and she can provide very comfortable accommodation for a small party if notice is sent to her the day before.

Early on New Year's Day we set off for the heights, crossing the Big River (Mitta Mitta) at about a mile from the start. This stream was running strong, and, having a bed of boulders, it was not easy going for the horses. Mr. Clinton, who, by the way, had ridden his bicycle from Mitta Mitta, now travelled on foot, preferring that to taking turns with me in the saddle. The track is not well defined till near the top, where some work has been done in track-forming round the steep spurs. After about four hours' climbing we reached a patch of Snow Gums, *Eucalyptus coriacea*, in the shelter of which is a hut belonging to Mr. Kelly, who runs cattle on the High Plains. The horses were allowed freedom in a paddock round the hut, and, after partaking of lunch, we started off for Mount Nelson, two or three miles away. This was reached by easy travelling over undulating, open country, with scattered patches of Snow Gums, and covered with a carpet of "Snow Grass," chiefly *Poa caespitosa*.

On the side of Mount Nelson we came across a patch of snow about fifty yards long, and below this, luxuriating near the ice-cold water, plants of the Silver Daisy, *Celmisia longifolia*, Snow Daisy, *Brachyscome nivalis*, and White Purslane, *Claytonia australasica*—the last-named a cushiony mass of white flowers in wet depressions. The Silver Edelweiss, *Ewartia Leni-*

podium) calipes, formed a beautiful carpet here and there on the most exposed parts. The cattle soon gathered round us



in curiosity and expectancy—fine herds of Herefords that are fattened on the plains in summer and driven down in late autumn to the lowlands, many of them to travel further to

market. Their fondness for salt makes it easy to muster them, for they will come at the call of the stockmen, who regularly take salt out to them. The vegetation of these plains consists of a stunted growth of the shrubs Alpine Hovea, *Hovea longifolia*, Baw-Baw Heath, *Epacris Bawbawensis*, Leathery Star-bush, *Pleurandropsis trymalioides*, Mountain Phebalium, *Phebalium podocarpoides*, and Mountain Beard-Heath, *Lenopogon Hookeri*. Hoary Sunray, *Helipterum incanum*, alpine form, and the Golden Everlasting, *Helichrysum lucidum*, were not yet blooming. They make a fine show later, which accounts for the warning given when starting up the hill—that we should not see many flowers.

Next morning early we set off across the plain, admiring the wonderful cloud effects, and reached what proved to be the most beautiful and interesting spot, the "Rocky Valley." The valley and the surrounding slopes were thickly strewed with granite boulders, and lovely clear streams fringed with alpine flowers flowed into it. The luxuriant form of *Celmisia longifolia*, var. *latifolia*, with large, daisy-like flowers and broad, silky-woolly leaves, was in itself a delight to the eye, while fine specimens of "Purple Eyebright," *Euphrasia collina* (pure white), interspersed with Baw-Baw Heath, *Epacris Bawbawensis*, and Snow Aciphyll, *Aciphylla glacialis*, added to the splendour of the clear streams which ran in little cascades over the granite rocks. The growth of Yellow Kunzea, *K. Muelleri*, with light yellow flowers, often took the form of a closely-appressed mat, extending up the sides of the boulders. In sheltered places among rocks and Snow Gums the beautiful Alpine Mint-bush, *Prostanthera cuneata*, and Slaty-Daisy Bush, *Olearia subrepanda*, were noted, the latter being photographed. Along the steep track on the scarp we were delighted with the show made by the Alpine Daisy Bush, *Olearia alpicola*, and Large-leal Daisy Bush, *O. megalophylla*. Three small plants rarely gathered were got in exposed depressions—Alpine Stackhousia, *S. pulvinaris*, Mossy Knavel, *Scleranthus mniaroides*, and Snow Pennywort, *Diplaspis hydrocotylea*. The first-named formed bright-green patches thickly studded with whitish, star-like flowers. A few blooms showed on the Leafy Bossea, *B. foliosa*, and the Pultenæas found flowering were Tufted Bush Pea, *P. fasciata*, and Hard-head Bush Pea, *P. capitellata*. The latter has been gathered only once or twice before in Victoria. It was for long considered as a form of *P. stricta*, but in my Revision of the Genus I restored it to the specific rank which Sieber gave it, and from which it should never have been lowered. In morasses were found thick growths of Richea, *R. Gunnii*, and the Liliaceous plant *Astelia alpina*. Two plants I had not previously gathered grew in these places



CELMISIA LONGIFOLIA, Cass., var. LATIFOLIA.



ALPINE STREAM IN ROCKY VALLEY.

Photos, H. B. WILLIAMSON.

—Alpine Flower-rush, *Carpha alpina* (Cyperaceæ), and the beautiful Veined Sun-orchid, *Thelymitra venosa*, and the only other orchid seen, the Short-lip Leek-orchid, *Prasophyllum brevifolium*. Plants of the silky form of the Common Buttercup, *Ranunculus lappaceus*, var. *sub-sericeus*, were gathered in fruit. *R. Muelleri* has been confused with this plant, and wrungly recorded for Victoria of late years.

Proceeding a mile or two further, we came to the "Pretty Valley"—rather a misnomer when applied to a broad plain with no vegetation above a foot in height, and traversed by winding streams, the banks of which, in places, almost hid the water. The most notable plants along these banks were the Rock Heath, *Eucryphia petrophila*, a dwarf shrub with very pretty white flowers, having the corolla tube very short, Dwarf Buttercup, *R. Millanii*, and the Sky Lily, *Herpolirion*, in wet depressions. Here also grew the Coarse Daisy, *Brachycoryne scapiformis*, and another of the same genus, a supply of which, as I suspected it to be a new species, Mr. Clinton and I spent some time in gathering. I have handed it over to Mr. Morris, of the Herbarium, who has undertaken the authorship of the plant. One had to be careful, or, rather, to allow one's mount to exercise care, in crossing the small streams, whose banks consisted of moss and other matted vegetation. I found my horse wonderfully reliable, and one could tell, by the way he tested the ground for a footing, that he knew the tricks of Nature in those parts.

On our way back to the hut we took a route that led us across what appeared to me a basalt cap. It appeared to be limited to about a square mile in extent, and was strewn with broken, sharp-edged fragments of basalt. In the report of the Secretary for Mines, Victoria, for 1856, it is stated that the basaltic portion of the Bogong High Plains has an extreme length from north to south of four miles and a width of three miles, containing an area of about seven square miles. In the report of the Government Geologist of the same year appears the following:—"The basalt or lava forming the High Plains is here referred to the Older Volcanic overlying the Miocene or Middle Tertiary deposits, as shown by their fossil flora. The general structure is columnar. Portions of the surface have the appearance of being paved with five-sided blocks of stone, many acres being covered with jumbled heaps of five-sided logs of basalt. This basalt, which is in places 700 feet in thickness, with no apparent vents or pipes, is highly magnetic, and observers of the party were obliged to ascend trees to escape the influence of the rock on the instrument." The vegetation on this area was rather scanty. One part stands up higher than the rest, and to this the cattle men have

given the name "Ruined Castle." It was a good example of columnar formation, the brick-shaped fragments being heaped at the base as they fell away. We had company at the hut that night, Cr. Payne, of Omeo, and his friends having set up their tents near the hut. Anyone intending to go to the plains *via* Omeo could not do better than seek advice from Cr. Payne as to horses and equipment.

On the following day we made our way across to the edge of the scarp overlooking the tremendous gorge made by the Big River, and looked across to the Big Bogong, which rises perhaps a thousand feet higher than the plains, and is the highest peak in Victoria. Our way then led down the long spur fringing that gorge, and, owing to the undergrowth and fallen timber, it was difficult going till we got to Wild Dog Creek. On the next day we had a full day's ride to Mitta Mitta, about 38 miles, stopping for lunch at Blair's, at Lightning Creek. Mrs. Blair, as well as being a kindly hostess, is a nature poetess, many of whose poems have appeared in Australian magazines. Here we were shown a fine box of the Umbrella Fern, *Gleichenia revigata*, which Mrs. Blair had rescued from the flood waters. At Granite Flat we passed the late residence of Mrs. M'Caan, now of Albury, who for years was a keen co-worker of "the Baron," as many labels on specimens in the National Herbarium show. She also delighted her friends by her flights into the poetic realm.

Mitta Mitta, at the junction of the Mitta River and the Snowy Creek, is a township which for many years was flourishing as the result of an enormous water-drive into an adjacent hill—the Pioneer Hydraulic mine. This deserted cut has walls in parts nearly 200 feet high, and is now full of plant growth, chiefly *Acacia pruriens*. The river scenery around this township is very fine, and, now that mining has ceased, the river flats are its chief asset. Very fine crops of maize are raised, and the village has the distinction of possessing the largest walnut tree in the State, one having a spread of over thirty yards. Three Acacias rarely gathered were seen—the Catkin Acacia, *A. Dallachinna*, in fruit on the high spurs, Buffalo Wattle, *A. Kettlewelliae*, very abundant at Glen Wills, and bearing an immense weight of pods; the latter, together with Mitta Acacia, *A. Dawsonii*, were recorded for Victoria from specimens sent to me by Mr. Clinton, and determined by Mr. Maiden, the author of the former species. I was pleased to gather at Mitta Mitta fruiting specimens of *Pultenaea stypelioides*. This was considered to be *P. procumbens* when first sent in, but it must now be referred to *P. stypelioides*. Other plants of interest not mentioned above which were collected were Mountain Phebalium, *P. phyllicifolium*, on the

top, all three Lomatias, intermingled, and blooming along the track at Glen Wills, *L. longifolia* making the best show. Along the side of Mount Wills and at other places of that altitude (4,000 feet) we passed through fine forests of that excellent timber tree, *Eucalyptus Sieberiana*, called "Woolly-butt" locally, though "Silver-top" is the name by which it should be known. A few miles up the Mitta from the township I gathered specimens of *Eucalyptus piperita*, Peppermint Stringybark. These, determined by Mr. St. John, constitute definite evidence for a record for Victoria which was previously doubtful. On the road cuttings near the town splendid masses of bloom of the Smaller Clematis, *C. microphylla*, revelled, and at the hotel a fine plant in flower adorned the fence. As to the fauna, several foxes were seen on the plateau, where also an enormous flock of Crows (or Ravens) suggested the possibility of beef scraps to tidy up.

[The paper was illustrated with a number of lantern slides, two of which are here reproduced. Omeo is not shown in the map; it is situated about half inch below right-hand corner.—ED. Vict. Nat.]

THE BUNYIP.

By E. J. DUNN, F.G.S.

AWAY back in the fifties and early sixties references to the "bunyip," both in conversation and in newspaper paragraphs, were far more frequent than at present, in fact, as that period of our history recedes the bunyip becomes more and more dim and mythical, and the question arises whether such a creature ever existed. So far as the aborigines' huge monster with long ears, clothed with feathers, armed with sharp teeth, and dangerous to men, is concerned, it is a myth—an emanation of the blackfellow's ghost-haunted brain—though it may have been based on some substantial foundation. But as regards the strange animal seen at so many localities, both in Australia and Tasmania, at various times, and by many different white men, the case is otherwise, for their veracity and intelligence were often unquestionable. Among others, Major Couchman, formerly Secretary for Mines, Victoria, whom I knew well, is quoted by R. Brough Smyth as having seen a strange animal in the Malmesbury Reservoir.

As might be expected, descriptions of the animal by diverse observers did not tally in all particulars; still, certain characters are pronounced. The animal was described as amphibiaous. It inhabited swamps, lagoons, water-holes, rivers, and lakes; was a strong swimmer and diver; its length was from three to six feet; head was round; it was clothed with fur of dark or

black colour. When swimming the head and a portion of the back were exposed. Flappers are referred to by some observers. Summing up these various characteristics, there is one existing animal that corresponds: the seal.

That seals formerly tenanted our rivers, though only temporarily, perhaps, I have had personal experience, for in 1856, in company with two families, I left Goulburn, N.S.W., and proceeded to Beechworth, Victoria, where we arrived on the 31st of October. We travelled in two tilted drays, each drawn by two horses. There were no roads—simply tracks, which wound their way between the trees; no bridges, but where large streams were crossed there were punts. On arriving at Gundagai the Murrumbidgee River was in full flood, and the punt could not be worked, so we camped for a day or two on the outskirts of the township until the water subsided sufficiently for the punt to be used, then we crossed over to this side of the river. On reaching this bank the track was so wet and muddy that it was decided to camp for the day and allow it to dry a little. While so camped we heard a strange "moo-ing" sound, something like the lowing of a calf, in the river, made by many individuals. We were all astonished, and went hurriedly to the river brink to see what made the noise. To our surprise there was a herd of animals swimming in the middle of the stream, and making good progress up-stream against a swift current. One of the party had a shotgun, which he loaded and discharged at them two or three times before they had all passed. We boys ran and got lines and fish-hooks, which we baited with meat, and cast towards the strange animals in the vain hope of catching one. Although making good headway against the stream, the herd took some little time to pass, as there were many of them. My recollection of these animals is that they had round heads, with no visible ears, but eyes that could be seen, dark-coloured fur, length of animals about five feet; while swimming the head and top of the back were exposed above the water. Up to that time I had not seen seals, but since then many have come under observation, and I have no doubt the animals I saw in the Murrumbidgee River were seals. Taking into account the windings of the Murray and Murrumbidgee Rivers, Gundagai would be about 2,000 miles from the sea (estimated).

On reaching Albury, on the Murray, which then consisted of three or four houses only, we saw a barge tied up to trees on the Victorian bank of the river, near Hovell's marked tree. In the previous year (1855) Captain Cadell made his first voyage up the Murray as far as Albury, and this was one of his barges, built, I believe, at Albury. We crossed the Murray by a three-mile boat trip to Wodonga.

Apparently, in the early days of colonization, when settlers were few and steam traffic had not been established on the rivers, seals from the coast made excursions up the rivers when they were in flood. Perhaps through sickness, or accident, individuals became separated from the herd and located themselves in lagoons and water-holes in lonely spots, and these gave rise to the bunyip stories. The main herds probably soon returned to the sea; while in the rivers they might have subsisted on the fish. When steamers began to ply on the Murray, such timid animals as seals would cease to frequent the river, and this would account for the simultaneous disappearance of the seals and the bunyip stories. The seal may have been the foundation on which both the white man's and the blackfellow's stories of the bunyip were built.

[REFERENCES:—"Aborigines of Victoria," R. Brough Smyth, 1878, vol. i, p. 435; "The Aborigines of Australia," J. Worsnop, 1897, p. 168; "Natives of Australia," N. W. Thomas, 1906, p. 244.]

[Some years ago considerable controversy took place in the papers regarding the bunyip. At the time Mr. Dudley Le Souëf, C.M.Z.S., Director of the Melbourne Zoological Gardens, furnished a reply, quoted in the *Naturalist* for July, 1917 (vol. xxxiv., p. 55), stating that the bunyip was no doubt the well-known seal of our southern coast-line, at one time much more plentiful than now.—ED. *Vict. Nat.*]

VISIT TO THE NATIONAL HERBARIUM.

A PARTY of about twenty members attended the excursion to the National Herbarium, South Yarra, on Saturday, 30th June. After some general remarks on the history of the institution, the members were shown the methods of keeping and working the collections. The Australian collections were viewed, after which the visitors interested themselves in the specimens collected by Banks and Solander during Captain Cook's voyage in 1770, the specimens collected by Petiver in 1668, as well as a small collection of the introduced weeds and poisonous plants. The main library was examined and the books of note were shown. These included Saccardo's "Sylloge Fungorum," a set of *Curtis's Botanical Magazine*, Fitzgerald's "Orchids," and the various works by Australian authors. The room housing the books on economic botany was next visited, and the works of the various Departments of Agriculture, as well as several finely-illustrated books on cultivated plants, examined. The ex-Australian collections were next visited, and here books by the pre-Linnean authors, O. Brunsel's "Herbarium Icones" (1532), Fuchs's "Historia

"Stirpium" (1542), Grew's "Anatomy of Plants" (1682), and the box in which the bones of the explorers Burke and Wills were brought from Cooper's Creek, Central Australia, proved of more than passing interest. The Herbarium was established in 1857, and ranks amongst the larger Herbaria of the world. The combined Australian and ex-Australian plants number nearly 1½ million sheets of specimens, whilst the library contains about 9,000 volumes.—J. W. AUDAS, F.L.S., P. F. MORRIS.

[Further notes on the National Herbarium will be found in a paper by the late Mr. J. R. Tovey, in the *Victorian Naturalist* for January, 1908 (vol. xxiv., p. 146.)—ED. *Vic. Nat.*]

AN EXCITING CONTEST BETWEEN TWO LIZARDS.—When going through the vegetable garden, about 10 o'clock on the 15th of November last, my attention was drawn to two Stump-tailed Lizards that were in my track. It is, however, not unusual to see two of these lizards together in the early part of November, as it is their pairing time; but the actions of these two were out of the natural order of things. I should mention that the Stump-tailed Lizard, *Trachysaurus rugosus*, Gray, is a heavily-built creature, about twelve inches in length, and weighing from one and a half to two pounds. The lizards appeared to be fighting, and one of the combatants (both were males) had all the scales bitten off right across the top of the head. This one I will call A., and it seemed that B. had a death-grip on the corner of the head and the back of the jaw-bone. A. appeared to be helpless. The bodies of both were bent round in a circular position, and every movement that was made was forward in a circle about one foot in diameter. They kept going in the same circle for some minutes, and at intervals B. would put all his strength into his jaws, and I thought sometimes, by the powerful grip that he had and used, that he would break the crown of the head of A. This went on for some minutes, till they got exhausted, and then B. let go his grip. Both lizards lay quiet for a little while, and their sides could be seen working for breath, like a horse after a race. When they recovered their breathing they again circled round one another, always going in the same direction—to the left—and in the same little circle. Both lizards now kept their mouths wide open, and both tried to get a grip, if possible. All at once A. got hold of B. by the front foot and held it fast: it seemed to give pain, for he shut his mouth and did not care to move much till A. let go of the foot. They were now panting for breath again. As soon as they recovered they again circled round one another, with their mouths wide open. The next

grip was in each other's mouths. The one that had the bottom jaw seemed to have the best grip to cause pain, for that one (B.) could grip the tongue. They soon let go and circled round again, each with mouths extended widely open. This time the attack was different. A. got hold of B. in the flank; he got a good grip, and was able to shake his antagonist like a dog would, and you could hear the teeth gripping on the scales. When A. let go they were again exhausted. When the gong sounded again for the next round, mouths were opened, and they circled round each other as close as they could; then B. got hold of A. on the back part of the head and held on for a while. The next grip was in each other's mouths, A. getting the bottom jaw. At the next grip B. got the hind foot of A. In the next round A. got B. behind the front leg. Up till then the two lizards had fought bravely, neither flinching from the other. I had sat watching the contest for nearly an hour, and wondered how much longer it would be prolonged, when both of them lifted their heads, looked about for a short time, and then all at once made off as fast as their legs would carry them. They ran into the vegetables two or three yards away, and then parted company. Thus ended one of the most courageous contests that could be witnessed for reptiles of this class. I think they must have fought for at least two hours, as I had watched them for nearly an hour, and by the execution done before I saw them I think the contest must have occupied quite that time. I have no idea what made them leave off the fight, for they took no notice of me, and when they made off they were both in the same mind. I have lived here in their natural home for nearly fifty years, and this is the first encounter of the kind that I have witnessed, or even heard of.—JAMES HILL, Westell Farm, Kewell.

“MEMOIRS OF THE GEOLOGICAL SURVEY OF VICTORIA: No. 14—THE BALLARAT GOLDFIELD.”—The survey of the Ballarat goldfield, now practically closed down, has occupied many years, owing to the intricate nature of the work and the extensive workings to be investigated. The memoir is by Mr. W. Baragwanath, the present Director of the Geological Survey Branch. It is most comprehensive in the information given, and is well illustrated with plans and figures. A geological map (coloured), with sections, is given of the area under review—about fifteen square miles. Some of the records of the different mines read like fairy tales, and the total gold obtained from the field is, as nearly as can be ascertained, of the value of £50,000,000. At first an alluvial field, it gradually became a quartz-producing area. Mr. Baragwanath says:—“The main features of the Ballarat field are—first, that the auriferous quartz is associated with certain favourable zones

of beds; and secondly, that payable quartz in the Ballarat East zone is found only in those beds of the favourable zones that dip east, while in the Ballarat West zone only in those that dip west. The Ballarat East and Ballarat West zones have not been correlated, nor has any clue been found to indicate the reason for the association between the dip of the beds and the gold contents of the quartz reefs that traverse them." Gold-mining at Ballarat dates from August, 1851, when payable gold was discovered at "Golden Point" (the intersection of Barkly and Young streets, Ballarat East), where an obelisk now stands marking the spot. Ballarat was famous for the richness of its early workings; unfortunately, owing to the excitement of the time, few records are now available, but it is known that instances of parties of four men sharing, day after day, 10 ozs. of gold per man were not uncommon. Nuggets were one of the features of the early mining days. In January, 1853, Canadian Gully yielded three nuggets, each over 1,000 ozs. The largest, the celebrated "Welcome Nugget," was found in June, 1858, at Bakery Hill, not far from where the Ballarat East railway station now stands, at a depth of 180 feet, and weighed 2,217 ozs., valued at £9,325. The last large nugget recorded was found in the Midas mine in August, 1887, and weighed 617 ozs. A number of quartz specimens—that is, masses of gold with more or less included quartz, are recorded, varying from 500 ozs. to 22 ozs. A large proportion of these came from the North Woah Hawp and adjacent mines at Ballarat East. The individual history of each mine is given in the Memoir, hence it is a valuable record on which to base calculations should ever an attempt be made to reopen some of the mines. The depth of sinking, influx of water, and heavier working expenses have probably doomed many of the mines to extinction. However, the 250 foolscap pages covered by the memoir will well repay perusal, and stand as a splendid piece of painstaking work. It is obtainable from the Mines Department at five shillings.

BIRD NOTES.

GROUND-TURUSHES IN THE BOTANIC GARDENS.—For the bird-lover, as well as the botanist, Melbourne Botanic Gardens may be called "happy hunting-grounds." A ramble through the gardens in the spring or early summer is a rare pleasure, and richer in records of birds seen and heard than a day in the bush may be. Mr. P. R. H. St. John has, for many years, kept a register of the species, residents and visitors, which, I hope, will some day be published in the *Naturalist*, with "field notes." It is a most valuable and interesting record.

PLATE VII.



AUSTRALIAN GROUND-THRUSH (*Oreocinclla lunulata*) AT NEST. IN
BOTANIC GARDENS, MELBOURNE.

Photo, CHAS. BARRETT.

Early in August Mr. St. John kindly advised me that a pair of Australian Ground-Thrushes, *Oreocinclla lunulata*, had a nest, with young, in a secluded "corner" of the Gardens. Next morning I called upon the Thrush family, and, despite dull weather, exposed a few plates. The nest was in shadow, on the broad leaf of a Cabbage-tree Palm, *Livistona australis*, about four feet from the ground. An excellent situation for photography; but "snapshots" in the shade, on a dull day, of course, were failures.

Two days later, with propitious weather to foster hope, I tried again, and succeeded. The mother bird (?) was a trifle anxious at first, but soon she gained confidence, and allowed me to move the camera near and focus finely, while she remained perched on the rim of the nest. I was able to give a time exposure, and thus secure a unique portrait of *O. lunulata* "at home," within sound almost of tram-car bells!

As a boy I became familiar with the silent, shadow-loving Thrush, which was fairly abundant among the tea-tree (*Leptospermum*) groves between Hampton and Beaumaris; now I seldom see it on my seaside rambles, though it is still far from rare in the hill districts.

In the Botanic Gardens the Ground-Thrushes have a sanctuary, where they may flourish long after their race has gone for ever from the haunts of week-enders and picnic parties along the coast near Melbourne. One sees the "natives" foraging on the lawns near, but not associating with, the English Song-Thrush. They hunt in the open, but find most of their food, perhaps, among decaying leaves beneath trees and bushes that grow close to the lawns.

The friendly pair did not allow my presence to interfere with their parental duties. One, at least, hunted assiduously, and twice in the course of ten minutes brought a beakful of fat worms to the fledgelings, which made rather a "crowd" in the nest. The other bird foraged in the vicinity, but seemed to have poor luck, and often ate what it did discover. I did not hear the Thrushes' song—a low, sweet strain, which usually is uttered just after dawn or when the sun is setting; but, when Mr. St. John first guided me to the nest, a run of curious trilling notes betrayed the mother bird's anxiety for the safety of her two chicks. Thereafter, both she and her mate were silent.—CHARLES BARRETT.

"A CENSUS OF VICTORIAN PLANTS."—This work of about 200 pages, containing the vernacular names for Victorian plants adopted by the Plant Names Committee of the Field Naturalists' Club and other useful information for botanists, is now in the press, and will be published about the end of the month. The price will be three shillings and sixpence in cloth.

HANDBOOK FOR THE MELBOURNE MEETING OF THE PAN-PACIFIC SCIENCE CONGRESS, 1923.—The handbook prepared for the use of visiting and local members of the Pan-Pacific Science Congress held in Melbourne last month was a very fine production, containing not only details of the meetings, but outlines of the excursions, which were really essays of great value, and in several instances illustrated with diagrams and maps. In fact, the information given cannot be obtained from any one publication, and the bibliographies included will save students an immense amount of time in the future; for instance, that attached to the Bacchus Marsh excursion includes no less than eighty-four items, even listing references in the *Victorian Naturalist*.

A MEMORIAL WATTLE.—The Melbourne Botanical Gardens was on Saturday, 1st September, the scene of an impressive ceremony, when the Wattle League planted a wattle in memory of the late Mr. J. Cronin, who had been president of the League for a number of years, and Director of the Gardens since 1909. Mrs. G. H. James, president of the League, said that, although Mr. Cronin had been a great man in the positions he had occupied, his tastes were simple, and a tree was such a memorial as he would have chosen could he have been asked what he desired. She asked Mr. W. Laidlaw, acting Director of the Gardens, to plant an *Acacia elata*, the Cedar Wattle of New South Wales, which, she hoped, would grow into a fine specimen, and thus keep green the memory of one who had done much in an unobtrusive way to make the Gardens the delight they are at the present time. The Cedar Wattle is one of the finest of the genus; specimens on the Western Lawn are over forty feet high, and covered with a wealth of bloom in January and February in each year. The spot chosen for the Cronin memorial tree is on the Eastern Lawn, not far from the groups of palms. Addresses were delivered by Sir James Barrett, a member of the Gardens Advisory Committee; by the Rev. A. F. C. Gates, of Lara, who spoke of the great worth of Mr. Cronin as a man, a friend, and a helper in regard to questions dealing with horticulture; by Mr. E. E. Pescott, F.L.S., vice-president of the League, who said that Mr. Cronin's talents as a hybridizer and raiser of new varieties of gardeners' flowers would have brought him a large income had he desired such, but he was content to give his best work without reward for the credit of the gardens he loved so well. Among those present to pay their tribute to the memory of a fellow-member were members of the Field Naturalists' Club, Royal Horticultural Society, Victorian Horticultural Society, the National Rose Society, and the Carnation and Dahlia Society.

The Victorian Naturalist.

VOL. XL.—No. 6. OCTOBER 4, 1923.

No. 478.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, 10th September, 1923.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about fifty members and visitors were present.

The president said that since the last meeting of the Club one of its oldest members had passed away in the person of Mr. W. H. Dudley Le Souëf, C.M.Z.S. In its earlier days Mr. Le Souëf had been a very active member of the Club, contributing papers and interesting exhibits to its meetings. It would be remembered that some four years ago a resolution of sympathy had been conveyed to Mr. Le Souëf on the occasion of an attack by footpads, by which he was seriously injured, and it is thought that this attack had considerably shortened his life. He moved that the sympathy of the members be conveyed to Mrs. Le Souëf and family in their bereavement.

The motion was seconded and carried in silence, all standing.

REPORTS.

A report of the excursion to South Morang on Saturday, 18th August, was given by Mr. F. G. A. Barnard, who acted as leader in the unavoidable absence of Dr. Sutton. He reported a good attendance of members and a lovely afternoon after a spell of wet weather. The object of the excursion was to see the Silver Wattles along the Plenty River in bloom, but it was found that, owing to the previous cold weather, they were not so forward as usual at that date. However, a number of Golden Wattles, *Acacia pycnantha*, were seen in full flower, and two of the smaller kinds, *A. acinacea*, Gold-dust Wattle, and *A. diffusa*, the Spreading Wattle, were in fair order. Rambling over the hills towards the Diamond Creek road, a few spring flowers were met with, the most noticeable being *Lissasauvagea* (*Styphelia*) *strigosa*, the Peach-heath, and the beautiful white stemless Scented Sundew, *Drosera Whittakeri*, but evidently the late winter had greatly interfered with the early flowering of the native plants.

A report of the excursion to Heidelberg for pond-life on Saturday, 8th September, was given by the leader, Mr. J. Stickland, who said that only a small party attended, but the results were very good. There had not been time to fully examine all the material yet, but the results would be published in the *Naturalist*.

The president said that, owing to the receipt of an invitation

from the Wattle League to attend the planting of a memorial tree at the Botanical Gardens, the excursion to Cheeseman's Nursery had been postponed. The proceedings at the Gardens were fully reported in the current *Naturalist*.

ELECTION OF MEMBERS.

On a ballot being taken, Miss Hilda Gabriel, Walmer-street, Kew, and Mr. A. C. Collins, 380 Flinders-lane, Melbourne, were duly elected as ordinary members of the Club.

GENERAL BUSINESS.

Mr. A. G. Brown referred to the effort being made by the Noojee Progress Association to secure the reservation of beauty spots in the district, and asked if the Club would assist in the matter. It was referred to the committee to take the necessary action.

PAPERS READ.

1. By Mr. F. M. Chapman, A.L.S., entitled "The Fossiliferous Beds of Violet Creek, near Hamilton."

The author stated that the locality as a source of Janjukian and Kalimnan fossils was a new record. The only fossil found previously was discovered many years ago by the Geological Survey; this was a coral, presumably of Balcombian age—*Deltocyathus viola*. Thus the entire succession of the Tertiaries, from Balcombian to Kalimnan, seems to occur here, as at Muddy Creek. The Janjukian bed was described as a polyzoal and foraminifera limestone, whilst the Kalimnan was a tenacious fossiliferous ironstone.

2. By Mr. S. Butler (communicated by Mr. J. Searle), entitled "Notes on Spiders."

The author, with the aid of a large number of lantern slides, gave a brief outline of the general anatomy, both external and internal, of spiders, their mode of living, spinning, egg-laying, &c. He also showed the differences between spiders and the other groups of the Arachnida. Reference was made to the various families of spiders found in Australia, showing, by means of lantern slides, the differences between the eyes, spinnerets, claws, &c., by which the families are distinguished.

Some discussion ensued, in which Messrs. H. W. Davey, F.E.S., F. Chapman, A.L.S., J. Searle, and C. Oke took part.

Mr. Davey asked the author if he considered the Red-backed Spider, *Latrodectus scelio*, to be a really poisonous spider.

Mr. C. Oke congratulated the author on the amount of information he had given on what was usually regarded as a

difficult subject, and hoped that he would continue his investigations regarding the classification of the indigenous species of spiders. He expressed the opinion that the bite of the Red-backed Spider was not so dangerous as is usually supposed, and little worse than the sting of the Red Bull-ant.

Mr. F. Chapman expressed the pleasure-with which he had listened to the paper and the way the subject had been treated, spiders being regarded by most people as repulsive creatures which should be avoided. He said if anyone cared to try experiments with the Red-backed Spider he could supply specimens, as they were very common about Balwyn.

Mr. J. Searle congratulated the author on the interest of his paper, and recalled some experiments made by the late Mr. C. Frost, who caused the Red-backed Spider to bite the combs of young chickens, when the only effect was that after a chicken had been bitten several times it showed signs of illness, but no fatal cases occurred.

Mr. G. Coghill said that he had listened to the paper with much interest, and thought that the Club was greatly indebted to Mr. Butler for reading the paper before the Club and for the excellent lantern slides he had exhibited. He moved a vote of thanks to Mr. Butler, which was carried by acclamation.

NATURAL HISTORY NOTE.

Mr. J. Thorn read a short note referring to the five species of Silvery Wattle Moths, of which he exhibited specimens of the larvæ, pupæ, and perfect insects.

EXHIBITS.

By Mr. F. G. A. Barnard.—Flowering branch of *Acacia Howitti*, grown in his garden at East Kew.

By Mr. F. Chapman, A.L.S.—Fossiliferous ironstone from the bed of Violet Creek, near Hamilton, Western Victoria—a new locality record; polyzoal limestone from Violet Creek, lower down stream in the bank of the creek—a new locality record; also type-slides of Foraminifera (19 spp.) and Polyzoa (11 spp.).

By Mr. G. Coghill.—Flowering branches of *Thryptomene Mitchelliana*, Bushy Heath-myrtle, grown in his garden at Canterbury.

By Mr. C. W. D'Alton.—Double-flowering spike of *Epacris impressa*, Labill., Common Heath, collected by exhibitor at Mount Difficult, in the Grampians, 6/9/23.

By Mr. C. Oke.—Case of insects from the Natya excursion, containing about 200 species of beetles and 25 species of moths; several species of spiders, with dissections of same; three

species of *Cordyceps* fungi, on the following hosts:—*Cordyceps Gunnii* on Porina larvæ (one of the Hepalid moths), *Cordyceps* (sp. ?) on an Elaterid (click-beetle) larva, and *Cordyceps* (sp. ?) growing from a Cup-moth cocoon.

By Mr. J. Searle.—The following spiders, or parts, under the microscope, in illustration of Mr. Butler's paper:—*Gasterocantha*, sp., *Arachnura Higginsii*, male spider to show pedipalps, and pedipalps of male spider.

By Mr. L. Thorn.—Five species of Silvery Wattle Moths of the genus *Thalaiga*, viz.:—*T. clara*, *T. angulosa*, *T. punctilinea*, *T. inscripta*, and *T. selena*.

By Mr. H. B. Williamson, F.L.S.—Specimens of *Ceratophyllum demersum*, L., Common Horn-wort, a water plant collected by Mr. T. S. Hart, M.A., at Pound Swamp, Bairnsdale, new for East; also section, under microscope, of phyllode and gland of *Acacia pycnantha*, Golden Wattle.

• After the usual conversazione the meeting terminated.

THE LATE MRS. W. MARTIN.—A few weeks ago we learned with deep regret that Mrs. Martin had passed away at her home, "Weebar," Drouin, on the 14th March last. Mrs. Martin, better known to the earlier members of the Field Naturalists' Club as Miss F. M. Campbell, took a great interest in the doings of the Club in its early years. She was an enthusiastic collector of fungi, and some notes about the fungi seen during a Club excursion to the Olinda Creek will be found in the *Naturalist* for July, 1884. She contributed one or two short papers to the meetings, and was a frequent exhibitor of macro-fungi. As related in a recent *Naturalist*, she had the honour of forwarding to England the first fruiting specimen of the fungus *Polyporus mylitta*, thus clearing up the nature of that curious substance known as "Native Bread," which had puzzled botanists for years. Her home at Drouin, to which she removed in 1892, was noted for its garden of unusual plants. Her last illness was a long and painful one. Her husband had predeceased her by some nine years. By her death the Presbyterian Church of Victoria will benefit financially to a considerable extent.

TO OUR MEMBERS.—The editor regrets that Natural History Notes have not come to hand as freely as was expected when the enlargement of the *Naturalist* was decided upon. It is hoped that this will be remedied before long. He specially desires that all matter be in his hands by the 15th of each month.

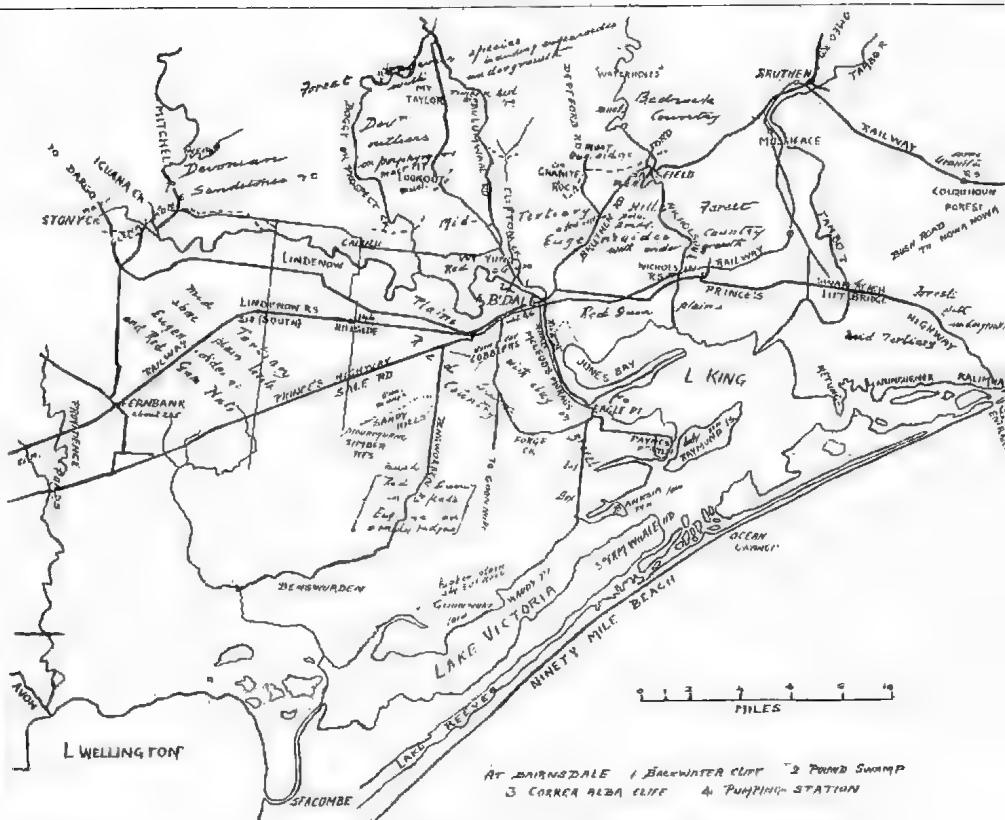
THE LATE MR. W. H. D. LE SOUEF, C.M.Z.S.

AUSTRALIAN natural history has lost, by the death of Mr. W. H. Dudley Le Souef, Director of the Melbourne Zoological Gardens, one of its most ardent investigators and exponents. Mr. Le Souef passed away at his home at the Gardens after a long illness on Thursday, 6th September, at the age of 66. It will be remembered that about four years ago he was the victim of a murderous attack by footpads, and this attack was no doubt the cause of the indifferent health from which he had suffered for some time. Mr. Le Souef had travelled far and wide through the Australian States in search of specimens for the Gardens or to endeavour to solve difficulties regarding native animals, birds, &c. He was always willing to bring natural history before an audience, and it is doubtful whether anyone in Australia has done better service in fostering a love for Nature in its many phases, especially among young people, than Mr. Le Souef. His lectures were generally illustrated by lantern slides from his own photographs, which made them doubly interesting. Though not a "foundation member" of the Field Naturalists' Club, he early joined its ranks, and for many years contributed interesting accounts of his various trips to its meetings. He was elected a member of the committee in 1885, and continued to serve in that capacity for some years. In 1901-2 he acted as co-secretary with the Rev. J. S. Hart, M.A., now Dean of Melbourne, and in 1901-2 in conjunction with the late Rev. W. Fielder. His papers in the *Naturalist* include visits to Mallacoota, the Mallee, Riverina, Queensland, Western Australia, &c. In these accounts his principal leaning was toward birds, but little escaped his observing eye, and other branches of natural history were not overlooked. He inherited his natural history tastes from his father, and shared them with his brothers. He also had a considerable acquaintance with Australian ethnology. He took part in the Club expeditions to King Island (1887) and the Kent Group (1890), and later made a trip to Albatross Island with the late Mr. H. P. C. Ashworth. He was an authority on snakes, and compiled the list of Victorian reptiles published in the first volume of the *Naturalist* (1884). He was joint author with Mr. A. H. S. Lucas, M.A., B.Sc., first editor of the *Naturalist*, of two standard works—"The Animals of Australia" and "The Birds of Australia." In "Wild Life in Australia" he brought together descriptions of his various trips published in the *Naturalist* and *The Emu*, &c., in a well-illustrated volume. His love of birds led him to become one of the founders of the Australasian Ornithologists' Union and a frequent contributor to its magazine, *The Emu*. Having been for many years Assistant Director of the Zoological

Gardens, in 1902 he was appointed Director, in succession to his father, and under his management it became the most important collection of animals, birds, &c., in Australia, and had few rivals in other countries. This office afforded him opportunities of visiting places outside Australia in the quest for new specimens for the Gardens, thus increasing his knowledge of the animals of the world and bringing him in touch with scientific societies, &c., in many countries. He had amassed a very large private collection of natural history objects of all kinds, and was ever willing to exhibit his treasures to anyone seeking information. The Field Naturalists' Club was indebted to him on many occasions for acting as leader on visits to the Gardens, when his remarks were always listened to with great interest. A large number of friends assembled at the Melbourne Cemetery on Friday, 7th ult., to pay their last respects to his remains, among whom were several representative members of the Field Naturalists' Club and the other societies in which he was interested. At the last meeting of the council of the Royal Zoological and Acclimatization Society a resolution was passed conveying the sympathy of the council to Mrs. Le Souëf and family, and placing on record "its high appreciation of the very valuable services rendered by the late Director, Mr. W. H. D. Le Souëf, through a long series of years, and expresses profound regret at the loss of a valued officer whose efforts have secured the splendid collection of exhibits now on view at the Zoological Gardens." One of his sons is an associate member of the Field Naturalists' Club, and, we trust, will in time become a worthy representative of his father, who was regarded by all who knew him as a genial, kindly man and a warm-hearted friend.

MICROSCOPY 150 YEARS AGO.—A member of the Field Naturalists' Club has in his library a curious old book of 440 pages, published in London in 1764 (second edition), with an elaborate title page of 28 closely-printed lines. It consists of two parts—firstly, "Employment for the Microscope," explaining the method of crystallizing various salts from solutions and watching the formation of the crystals under the microscope; and, secondly, "An Account of Various Animalculæ." Both parts are well illustrated, there being 17 plates of engravings on copper of various objects. The author was Henry Baker, a fellow, and some time president, of the Royal Society of London. Being printed with the long s (like f) it is somewhat difficult to read, but it gives an excellent idea of the state of microscopy 150 years ago.

PLATE VIII.



MAP OF BAIRNSDALE DISTRICT.

BOTANICAL NOTES ABOUT BAIRNSDALE AND THE EASTERN LAKES.

BY T. S. HART, M.A., B.C.E.

(Read before the Field Naturalists' Club of Victoria, 11th June, 1923.)

To present the chief points of botanical interest in this district, and to avoid undue length, I propose to refer to the chief types of vegetation, and among individual species to those mainly which do not occur in the western parts of the State, to those not recorded in the "Key" as eastern, and to others about which there is some point of interest. Many of the far eastern Victorian plants do not reach as far west as this.

As a preliminary climatic note, the average rainfall is about 28 inches per annum at Bairnsdale (26 by another record), well distributed, but with the highest averages in September and January, according to the detailed information available over a part of the period of the records. The intervening months are sufficiently rainy to make the spring and early summer, by a small amount, the part of the year with highest rainfall. The lowest averages are in April and August, the dry April contrasting with Melbourne, indicating that the rains of that season do not readily penetrate so far to the east. A somewhat drier belt of country runs through Sale and Maffra, on the west. To the east the rainfall gradually increases, though there are relatively dry areas. In individual years the heaviest rain or dryness may occur in any month. In the native vegetation plants of dry situations must be able to stand summer droughts; in the valleys there is more luxuriant growth, due to all-the-year-round adequacy of moisture, and here eastern types are more abundant.

It may be noticed that the average rainfall is about that of Kew, but the number of rainy days appreciably less.

THE RED GUM PLAINS.—These are grass land with trees and little shrubbery, the prevalent eucalypt being the Forest Red Gum, *Eucalyptus tereticornis*, with occasionally Swamp Gums, *E. ovata*, at wetter places, and subordinate Yellow Box, *E. melliodora*, and But-But, *E. Bridgessiana*, occasionally, and at places not typical the Gippsland Box, *E. Bosistoana*. The Erect Sheoak, *Casuarina suberosa*, is plentiful, but about Bairnsdale *C. stricta* is absent from the general run of the plains, being found further to the south and in two places on the edge of the steep fall to the river above Bairnsdale. As it is common at Sale and Maffra, we may conclude that the slightly greater rainfall is restricting it to drier situations, whereas in some of the drier country *C. suberosa* is seen to prefer the lower and moister position at the foot of a hill slope. Other trees are

Black Wattle, *Acacia mollissima*, and Lightwood, *Acacia implexa*; occasionally, *Banksia marginata*.

For the smaller plants a good locality is west of the Sale road crossing. Among the orchids are *Pterostylis falcatu*, *Diuris punctata*, *Prasophyllum fuscum*, *Pterostylis curta*, *Eriochilus autumnalis*, and others. *Viola betonicifolia* is sometimes very fine, and apparently paler in the wetter situations. The Sundews are *Drosera peltata*. I have not seen *D. Whittakeri* here. *Bartsia gracilis* occurs at a paddock on the Sale road, and quite deserves its specific name.

The plains being nearly flat, and with a clay subsoil, the water lies about in places. In the borrow pits of the railway and in other places we may see the curious *Philydrum lanuginosum*, the sole Victorian representative of a very small family of plants. At first I considered the possibility of its having been introduced, but, as it occurs in many natural swamps, well away from the railway and over a wide area, the idea may be dismissed. It may attain a height of five feet in a natural swamp, with as many as 150 buds on a slightly-branched inflorescence, but it usually opens only one or two of its yellow flowers on a stem or branch at once, and loses in showiness. *Damasonium australe* also occurs in pools on the plains and river flats; but its relative, *Alisma*, belongs to the river backwaters. *Crotonia paniculata* likes the moist places, and in the pools of an intermittent creek is the Large Marshwort, *Limnanthes geminatum*.

Close south-west of Bairnsdale the plain is cut through by the steep-sided Cobbler's Gully. On the well-drained, sandy slopes are Manna Gums of the Brighton type, *E. viminalis*, and White Sallee, *E. coriacea*. Eagle Point Park, six miles down the river, may also be considered as a dissected edge of the plain. A bluff, rising steeply to 90 feet above the river, affords a fine view of the lake and more distant country. Behind is a hollow in which a small lagoon, used by stock, carries *Azolla*, *Lemna*, perhaps *Wolffia*, and *Riccia*, floating on its surface; among its fixed plants is a form of *Ranunculus rivularis*, probably variety *inundatus*. At another part, independent of this valley, is a salt marsh. The Swamp Paper-bark Tea-tree, *Melaleuca ericifolia*, on its margin carries *Cassytha phaeolasia*, Long-spiked Dodder Laurel. The trees of the park are Red Gums, Manna Gum of the Brighton type, and a Box best placed as *E. Bostistoana*. *Bursaria* is abundant in good specimens. It is called Myrtle locally (whence the names Myrtle Point and Myrtle Gully in other parts of the district). *Hymenanthera* and *Kunzea peduncularis* are other abundant shrubs. *Clematis glycinoides* is abundant; it is the common Clematis of the district. *Pterostylis concinna* and *Corysanthes*

pruinosa occur. The dryness of the surface soil of the hills is indicated by a succulent *Claytonia* and *Stellaria pungens*.

On the bluff are the furthest inland specimens of Coast Tea-tree, looking quite natural, but possibly introduced, as Tyers had a residence here. A Cassia locally called "Glory Bush," is certainly a garden relic, and has contributed, no doubt, to many Bairnsdale gardens. *Senecio mikanioides* is also an escape, and should be watched lest it become a nuisance.

THE LOWER HILLS.—These are easily seen north and north-east of Bairnsdale, on the Buhmwaal and Bruthen roads. Being composed of the Tertiary sandstones and associated materials, they have a light, well-drained soil, affording a good root-run, and are well covered with trees and shrubbery, with smaller growth. White Stringybark, *Eucalyptus eugenoides*, is the prevalent species, with Red Box, *E. polyanthemos*, But-But, and some *E. goniocalyx*. Manuka, *Leptospermum scoparium*, and *Kunzea peduncularis* are common. The latter, locally called Black Tea-tree, is acquiring a bad reputation for re-establishing itself on cleared lands and becoming rather a pest. Well grown, it is said to form good fishing rods. Here are also the close-flowered Geebung, *Persoonia conseriflora*, *Bossiaea microphylla*, *Hibbertia linearis*, *H. Billardieri*, and *Phyllanthus thymoides*. The curious little *Pomax umbellata*, with its coherent fruits, is a proved poison plant, yielding hydrocyanic acid; but its small size makes it unimportant. The Pinkeyes, though coming within the comprehensive *Tetralobaea ericifolia*, are not typical for that species. *Clematis aristata* occurs, but it is not very abundant. Among orchids, the most interesting are *Chiloglottis diphylla* and *Corysanthes fimbriata*, both autumn or winter flowering.

The Red or Saw-leaved Honeysuckle appears at places in the *eugenoides* country, but it is especially characteristic of another and poorer variety of the light Tertiary soils. Southwest of Bairnsdale, in sandy ridges, there occur, with this Banksia, Manna Gums of the Brighton type and Howitt's "*Eucalyptus amygdalina*, variety c," to which we may give the name "Sandhill Peppermint," with an undergrowth of *Ricinocarpus*, *Leptospermum myrsinoides*, *Acacia Oxycedrus* with *Leucopogon ericoides*, locally called Heather, *Correa speciosa*, of the red-flowered variety, and *Bossiaea heterophylla*, an autumn-flowering, broom-like Pea with few leaves. At one part *Caleya major* and *minor* both occur, the latter flowering early in December. This is very poor country; in some of it I have never seen stock. Kangaroo are sometimes seen. At the end towards Bairnsdale is a charcoal-burning plant using iron kilns. Yertchuk, *E. consideniana*, occurs, in part, at least, below the driest ground.

With this may be placed the country passed through on the railway west of Fernbank, on the rise from Providence Ponds. The Red Correa and the Heather can scarcely escape notice in the season; and in later spring the Crimson Bottlebrush, *Callistemon lanceolatus*, which is largely, but not all, in the flats. Such plants as *Astrotricha ledifolia*, *Grevillea floribunda*, are less easily recognized from the train. Besides these, *Brachyloma daphnoides* and *Acacia Mitchellii* are here, though not given as east in the "Key." *Dampiera stricta* occurs. Here also is *Isopogon anemonifolius*, for which, I believe, this is the only recorded Victorian locality. *Drosocra auriculata* occurs, contrasting with the *D. peltata* of the plains, which are wetter in spring. *Drosera sphuthulata* occurs at a drain, and Coral Fern has established itself at an ooze in a railway cutting.

A little west of Providence Ponds there is a patch of the Fairy Waxflower, *Eriostemon obovalis*, and about here also the Mealy Stringybark, *E. cinerea*, var. *multiflora*, is more common, and of the very blue form seen from Moe eastward. This is the tree which was formerly thought to be *E. pulverulenta*. Though this tree, as well as But-But, have separately been called *E. Stuartiana*, they were not regarded as the same tree. This is clear in Howitt's work, where "*Stuartiana*" is But-But; his later opinion that But-But is likely to be Baker's *E. Bridgesiana* is to be found in his appendix to Herman's report of the geology of Walhalla.

A noteworthy strip of country lies to the south-east of Lake Victoria. Some of its plants are those of the parts just mentioned. I have been able to visit it at Sperm Whale Head, opposite Paynesville, and behind Seacombe. At both these places, seventeen miles apart, there occurs *Thryptomene Miquelianiana*, only known here in Victoria; it may occur outside and between these limits. At Sperm Whale Head it forms the principal undergrowth over considerable areas, sometimes with abundant *Calythrix tetragona*. In this district also *Astrotricha pinifolium* is abundant, and *Calycya minor* was seen. Behind Seacombe, on the sandy hills, was *Acacia suaveolens*.

The low country bordering Lake Victoria, near Goon Nure, would also probably prove interesting, but I have only visited it in autumn. Some Grass-trees, presumably *Xanthorrhoea australis*, occur. *Banksia marginata* in the tree form is seen to like lower ground than *Banksia serrata*.

Raymond Island, opposite Paynesville, is another low area. While much of it is poor Manna Gum country, some of the flats carry Swamp Mahogany, *E. botryoides*, as well as Red Gum. It is worth notice that at Orbost the *botryoides* is not restricted to the flats.

Eastward from the Tambo River, on the road to Lakes' Entrance, the Narrow-leaved Geebung, *Persoonia linearis*, may be seen, and *Acacia discolor*, the Sunshine Wattle, flowering in early winter, becomes more common. The Dusky Coral Pea, *Kinmedya rubicunda*, occurs in a valley.

On the shady cliffs about Kalimna we find *Olearia viscosa*, also the Blanket-tree, *Bedfordia salicina*, Musk, and others, as well as many of the characteristic valley plants of the district. Among the climbers we may mention *Celastrus australis*, with the conspicuous orange-yellow aril of the seeds showing in the open capsule about April; *Marsdenia rostrata*, the Stalked Doubah, with flowers of the peculiar asclepiad type and long fruit with hairy seeds; *Smilax australis*, sometimes sending out shoots in luxuriant growth leafless for some feet in length; and two other liliaceous climbers, *Geitonoplesium cymosum*, with deep purple berries, and *Eustrephus latifolius*, with yellow. Lillipillies, *Eugenia Smithii*, occur in a valley, and *Pittosporum undulatum* may be seen on the cliff.

These meet at the foot of the cliffs with marsh or coastal plants. The Boohialla, which is common, is, however, a valley as well as a coastal plant in this district.

I have not collected *Acronychia levis*, but Mr. D. Paton tells me that it is at Kalimna.

Near Nungurner there is the eucalypt sometimes called *E. Maidenii*, sometimes *E. St. Johnii*. Howitt gives a locality near Kalimna for his "*E. amygdalina*, variety *e.*" which Baker makes *E. radiata*. Elegant examples may be seen also near the road bridge over Boggy Creek, at Nowa Nowa.

Chiloglottis trapeziformis occurs near the foot of a cliff near Paynesville.

THE COASTAL HUMMOCKS.—Many of the common coastal species occur. We may note also *Scavola suaveolens*, the Scented Fan-flower, with fine purple berries in autumn; *Senecio spathulatus*, Spoon Senecio, often as isolated plants or near the outer edge of the vegetation; and *Stackhousia spathulata*. The broad-leaved form of the Mistletoe, *Loranthus celastroides*, occurs on *Banksia integrifolia* and on Sea Box, *Gynepogon* (*Alyxia*). This is the original *celastroides*, the common variety being the *eucalyptifolius* form included in this species.

The berries on several of the plants are a feature of the coastal scrub in autumn; they indicate birds as seed distributors. On the other hand, *Cakile maritima*, growing at the line of rubbish on the inner shore, suggests water-carried seeds. The fruits will float. Among other plants, *Tetragonia expansa*, New Zealand Spinach, occurs on the inner side of the Hummocks and at many suitable places about the Lakes.

WET SITUATIONS—SALT MARSHES.—The wet situations vary

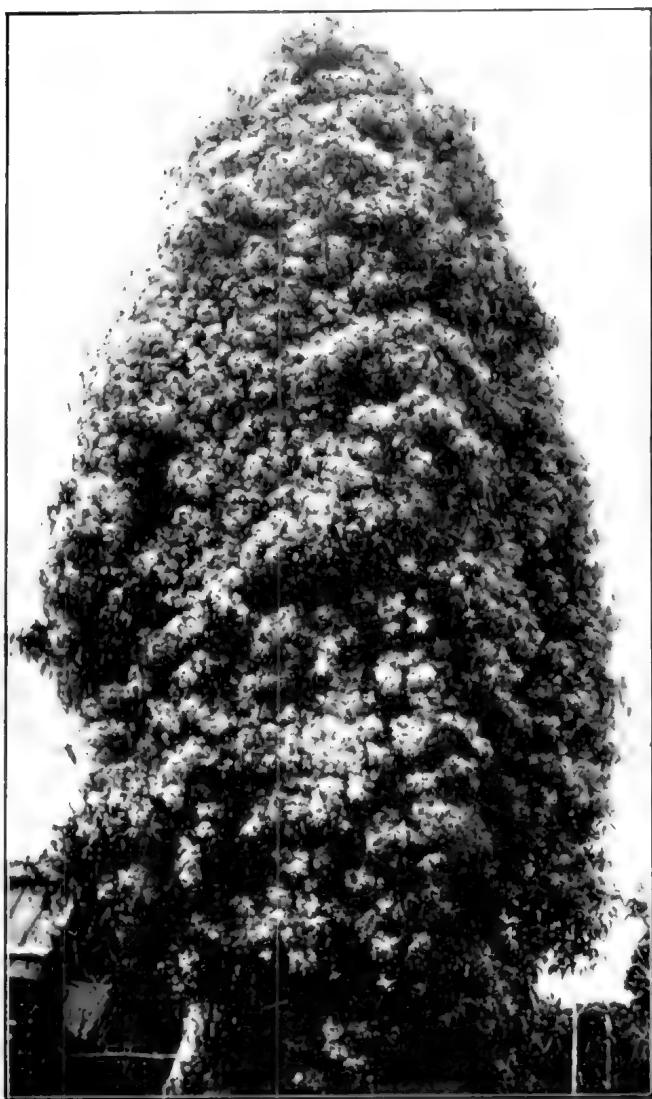
in depth, duration, and quality of the water. Beginning with the salt marshes, the Swamp Paper-bark appears, from the Baron's statements, to be able to stand water about half as salt as sea water, but it is not clear for how long. Near Lakes Entrance it has died off considerably; this is commonly attributed to the permanent open entrance, which would, no doubt, increase the saltiness and maintain it. *Suaeda*, *Salicornia*, *Juncus maritimus*, *Samolus repens*, and others occur at the west end of the Lakes' Entrance township. I have even seen *Mimulus repens* in flower temporarily under tidal waters; possibly some ground had slipped to a lower position. On Jones's Bay, at East Bairnsdale, *Salicornia* occupies the lowest ground; slightly higher, but still very low, the Rounded Pigface, *Mesembrianthemum australe*, grows in such quantity that acres of a blaze of pink are seen from miles away in the flowering season. *Selliera radicans*, a small *Triglochin*, *Cotula coronopifolia*, and *C. reptans* occur. There is a very small *Cotula* flowering on a single stem, with few leaves, but it may be merely precocious flowering of seedling *coronopifolia*.

A small *Plantago* and the grass *Distichlis spicata* also occur in salty ground.

In a salt marsh near Waddy Point, Lake Victoria, *Sebaea albidiflora* occurs; it is not given as east in the Key, and the place has had communications with Footscray, but it is probably native. I do not know whether it occurs at Footscray.

A different type of wet place is found in M'Leod's Morass, just south of Bairnsdale township. Having only a small connection to the river, and only to the open lake through five miles of river, and receiving the drainage of some twenty-five square miles of country, it is not so salt as Jones's Bay, and is also liable to long-continued flooding. It has, however, considerable soluble salts, in part magnesian, which come out as an efflorescence on the soil in dry weather. Some of the springs at its edge are salty with common salt. The lower parts carry a dense growth of tall rushes, apparently *Juncus pallidus*, reaching, on the edge of the made channel, to eleven feet in height—often six. In these are roosting-places of innumerable Starlings. The mineral basis of the soil being sticky in the lower parts, it is quite possible that grazing when wet may have caused serious deterioration. *Mesembrianthemum* and *Salicornia* are absent, though many salt marsh plants occur. *Hydrocotyle vulgaris* and two other species of this genus—probably *H. pterocarpa* and *H. tripartita*—occur. *Calystegia sepium*, the larger Bindweed, grows over the rushes. *Melaleuca* occurs at the far edge, but not in the rush beds. Spurry, *Spergula arvensis*, is abundant, a plant of good repute for

PLATE IX.



CLEMATIS GLYCINOIDES, De C.
Growing over a dead tree at Lake Bunga.

Photo, BULWER, Bairnsdale.

sheep, but regarded as an indicator of bad soil condition in cultivation; it is not native.

At the sulphur springs in the Clifton Morass *Phragmites communis*, *Scirpus lacustris*, and others were found with freshly-deposited sulphur about them. On the Nicholson flats there are at places acid waters from decomposing marcasite. The drains are at places bare, but the Bulrush, *Typha angustifolia*, is one of the first plants to appear as the drains are followed down. The flats are, of course, good soil apart from these acid waters at spots.

South-west of Bairnsdale, and in parts of the sandy country, as near Farnbank, there are numerous swampy areas, carrying mainly *Lepidosperma*, sp.; *Philydrum*, already mentioned, grows in these.

THE LIMESTONE CLIFFS.—Opposite Bairnsdale a limestone cliff faces south on the Backwater. It carries a dense growth of *Rapanea* (*Myrsine*), *Boobialla*, *Bursaria*, *Pomaderris*, *Hymenanthera*, &c., in which the difficulty of penetration is increased by occasional Boxthorn and Hawthorn. Creepers are also abundant—*Clematis glycinoides*, *Marsdenia rostrata*, *Eustrephus*, and *Geltonplésium*—and at the water's edge an occasional garden Honeysuckle. The nettles are tall, and hang among the bushes near face level. *Pimelea axiflora* is plentiful. On the nearly opposite, bare, sunny cliff at Pound Swamp, *Pimelea glauca*, a common Keilor Plains species, occurs, but no *axiflora*—now, at least. *Marsdenia flavescens*, the Yellow Doubah, occurs here, but I am not sure of its requirements as to habitat. A few plants of *Celastrus* survive. *Plectranthus parviflorus* and *Enchylium tomentosa* also occur.

A little higher up-stream a cliff on the north side, with a south-westerly aspect, carries an abundance of *Correa alba*, the White Correa. I have not noticed this coastal plant on the Hummocks at this coast, but a limestone cliff is a dry situation. *Boobialla* and Coast Honeysuckle occur here, and the three are found also further up-stream. *Scaviola microcarpa* grows on this cliff and, on one at the Nicholson, also limestone. *Cynoglossum australe* occurs on the lower slopes freely. (The Scaviola is just below the chief crags, but the soil is no doubt calcareous.)

THE MAIN VALLEYS.—The flats are mostly cleared, and largely used for maize and for grazing, but remnants of the valley vegetation may be seen. The first Kanookas, *Tristania laurina*, occur on the Mitchell near the pumping station, at the west end of the township; further up they are more common. *Callistemon paludosus* occurs, and pink and cream flowers may be seen on the same plant. Examination showed on one such that the flowers opened pink and faded. Prospect

Creek: comes in from the north a few miles up; it is commonly called "Boggy Creek," and care must be taken to distinguish Boggy Creek at Nowa Nowa. A mile up this creek the valley carries Kanookas, *Lomatia longifolia*, *Baeckea virgata*, a green-flowered *Correa speciosa*, and *Prostanthera rotundifolia*, Round-leaved Mint-bush. *Cyclophorus (Polypodium) serpens* and *Hymenophyllum tunbridgense* are abundant, and other ferns occur under the shade of a cliff and trees.

Higher up this valley is of more ordinary character, but *Howittia trilocularis*, Shrub Mallow, *Callistemon lanceolatus*, Crimson Bottlebrush, *Acacia verniciflua*, Varnish Wattle, and *Lasiopetalum dasypphyllum*, with its curious flowers, and handsome foliage, may be found.

At Glenaladale the Mitchell issues from its gorge and into the same flat come Iguana Creek and Stony or Moilun Creek. On the Mitchell above Glenaladale, Currajongs, *Brachychiton populneus*, may be seen. In the lowest gorge of Iguana Creek a clear stream runs over the Devonian sandstones. The lowest ground carries Lillipillies, *Eugenia Smithii*, Kanooka, *Tristania*, *Pittosporum undulatum*, *Eleocarpus*, &c. The Pittosporums are also seen perched on the cliffs.

On the other side of Bairnsdale we have, at Sarsfield, the Nicholson issuing from the hills through a steep-sided valley in bedrock. A path leads along the west bank from above the last house near the old ford used by M'Millan in 1840. We may notice *Leptospermum attenuatum*, Slender Tea-tree, as a very graceful element in the valley vegetation. *L. flavescens* is at the water's edge. *Phebalium squamulosum*, Sealy Phebalium, is abundant. A few plants of *Eriostemon trachyphyllus* occur; *Pomaderris betulina* occurs. *Micranthemum hexandrum*, *Phyllanthus Gunnii*, and *Beyeria lasiocarpa*, of the Euphorbia family. The Wonga Vine, *Tecoma australis*, is added to the other climbers. There are no Pittosporums; the local resident using this name refers to *Rapanea*. Kanookas occur abundantly, and others already mentioned. A little higher up the valley *Calythrix* is abundant among rocks, and *Pomaderris phylicifolia* also appears.

On the river at Bairnsdale we are not above tidal influences, and the water is salty, especially when the river is low. Silver and Black Wattles and Blackwoods, *Callistemon paludosus* and *Leptospermum lanigerum*, and rarely *flavescens*, occur. The *Callistemon* I have not noticed below the wharf, but the Woolly Tea-tree extends a long way down. The riverside gums at Bairnsdale are Red Gum, *E. tereticornis*, Gippsland Box, *E. Bostistiana*, Manna Gum, and Swamp Gum, *E. ovata*. Of these the Red Gum extends to the mouth of the river; some trees carry shorter and stouter buds—possibly a salt effect.

The Common Reed, *Phragmites*, is worth a note as a most valuable plant for breaking the wash from the river steamers and protecting the banks both by its roots and its mass of stems. It needs to be tied down to establish it. An earlier protection is made by wire-netting with Boxthorn thrown in behind it. Soundings in the Backwater gave seven feet of water just outside the Reeds.

"The Backwater" (Bairnsdale), which is open to the river below and receives the waters of Clifton Creek, carries in the water *Cladium articulatum* and *C. jamaicense* (Mariscus), Club-rushes, *Scirpus lacustris*, and occasionally *maritimus*, the Bulrush, *Typha angustifolia*, and *Phragmites*. In Clifton Creek the boat's progress is eventually arrested by *Triglochin*, *Vallisneria*, and other plants.

The Pound Swamp, a permanent billabong disconnected from the river in ordinary flow, situated a short distance up the Mitchell flats on the town side, presents a banded appearance in the water vegetation, the species being mixed, but different ones predominating in successive zones. Care is necessary, as the water near the cliff deepens somewhat rapidly, and the bottom is irregular from limestone blocks. At the edge *Scirpus lacustris* occurs, with patches of *Alisma plantago*. Further out are *Triglochin procerum* and *Jussiaea repens*, with partly floating habit. *Heleocharis sphacelata* is in patches. *Myriophyllum elatoides*, in part mixed with the *Jussiaea* and *Triglochin*, predominates after these cease: *Vallisneria*, also occurring in shallower waters, is seen outside this Coarse Water-Milfoil. Beyond I thought to be clear water, but in the spring of 1922 abundant flowers of a *Potamogeton* appeared. Obtaining some by spearing with a rod, hook, and line, I determined it as *P. ochreatus* (*P. oblongifolius*). A piece reached a length of 9 feet 3 inches, but the depth of water was not ascertained. In April, 1923, the water being very low, on a still day I was able to see clearly this *Potamogeton* still well submerged. (Since this was written I have obtained *Ceratophyllum* here, probably growing near *P. ochreatus*.)

The orchid *Dendrobium striolatum* was found freely at one place on rocks on and below a steep, shady cliff. The epiphytic orchid, *Sarcochilus parviflorus*, was also noticed on trees, in one valley only, in good shade.

Jussiaea is sometimes found at the water's edge out of water, and is creeping as well as floating. It sometimes, at least, shows white outgrowths, best regarded as related to aeration. It is possibly significant that the best examples I found were in a somewhat polluted water, but a seasonal effect may be involved: they were found in late summer.

I have referred little to the hills of older rocks to the north,

which I have not so much examined. The country north of the Tertiary area is still forest, with undergrowth, and *E. eugenoides* and other species continue. *E. macrorrhyncha*, Red Stringybark, appears on all the older formations—Ordovician bedrock, granitic rocks, and Devonian. Howitt's "*E. amygdalina*, var. *n.*," common form, appears; it also is rare—if it occurs at all—on the Tertiaries.

A patch of Yellow Stringybark, *E. Muelleriana*, occurs on and about Mount Lookout on Devonian and porphyritic rocks. Another patch occurs in bedrock country near Water-holes on the Nicholson, but whether actually on bedrock or alluvial I did not ascertain. Near Orhost the Yellow Stringybark occurs on what appears to be ordinary Tertiary country. Messmate, *E. obliqua*, is not common near Bairnsdale, a patch occurs just north of Bulunwaal with *E. cinerea*, var. *multiflora*. The Red Ironbark, *E. sideroxylon*, occurs on the Tertiaries as well as the older formations, though sometimes they begin at the change of the formation, and the same applies to Golden Wattle. Ironbarks reach to close to the sea cliff east of Lakes' Entrance. There is no *E. leucoxylon* in the limited sense; if the name "White Ironbark" should be heard applied to an East Gippsland tree it will probably mean *E. Sieberiana*. Hickory Wattle, *Acacia penninervis*, occurs mostly on bedrock country, but there is a patch on Tertiaries near the Moormuring Timber Reserve. *Hakea eriantha* belongs to the older formations, and a very prickly Leucopogon occurs on bedrock country. On Granite Rock, about seven miles N.N.E. of Bairnsdale, I found *Isotoma axillaris*, a fine, showy species, worth cultivation, but intensely aerid. *Rubus rosifolius* occurs on Mount Lookout, agreeing closely with Howitt's west limit for it on Mount Taylor. It very likely will occur in the lower country as well. In fact, there is ample evidence generally to show that care is necessary in stating the preferences of any of the rarer plants.

The map shows the positions of the various places referred to, but does not claim to show the creeks and crooked roads exactly. Obvious abbreviations indicate localities for various eucalypts, not necessarily the prevalent species. The dotted line indicates roughly the position where the older rock-formations are met with. The phrase "*eugenoides* country" needs interpreting as above; there is plenty of *eugenoides* further north.

LOCAL HANDBOOKS.—We are pleased to learn that the Tasmanian Government has recently published two handbooks dealing with the shells of that State, and hope to have an opportunity of giving an extended notice of them in these pages at an early date.

CITY BIRDS

IN a busy suburb, almost within stone's-throw of the tram line, and in the moderate quarter-acre enclosure for residence and garden, one would not expect to find much variety of bird-life ; yet throughout the year, if species are not very numerous, the number of individual birds is remarkably so. Trees and gardens attract birds, but those cosmopolitan birds, such as the Sparrow, the Starling, and the Indian Mynah, have so thoroughly adapted themselves to urban conditions as to live and thrive in the most populous districts—more at home among chimneys and housetops than among trees. From time to time an outery is raised against each or all of these introduced birds, which in cities and towns serve a useful purpose, not only as effective scavengers, but also in giving life and cheerfulness to drab surroundings.

In our garden the sober-feathered but perky Sparrow is a constant visitant, flitting with cheery note and observant eye from fence to lawn, from roof to tree. The Starling, that bird of uncanny sagacity, is ever with us. From his extensive vocal repertoire of varied notes, calls, and cries, among which are "Pretty Joey" and "Where are you working?" he may be heard from sunrise until after sunset in pert converse with his neighbours. For three seasons a pair of Starlings have built a nest just opposite our window, in the wall of a house from which a brick has been dislodged, whilst a couple of years ago quite a family of Starlings built their nests above the ceiling of the kitchen, making their entry under the corrugated iron. So great was the nest material they brought in, and the noise of their coming and going so constant, that ingress had to be stopped. Starlings are fond of the figs when nearly ripe, leaving little beside the skin and stalk, returning again when frightened away, if a Starling can be frightened.

The Indian Mynah is not so numerous, and contents itself with picking up crumbs and scraps from the lawn. The Blackbirds, usually in pairs, are frequent visitors. Last season, from some carefully-hidden nest, a mother bird appeared with two young ones just learning to fly, and for a fortnight found shelter in a musk tree in the garden. They are welcome birds, graceful and intelligent, less bold than the others mentioned. The Java Pigeon, always looking in prime condition for the table, appears from time to time in search of crumbs and unconsidered morsels. It is fairly numerous, and its somewhat monotonous note is frequently heard.

These are all city birds in habit and environment, but from time to time we get real country visitors. The Welcome Swallow once in a while perches on the telephone wire just under

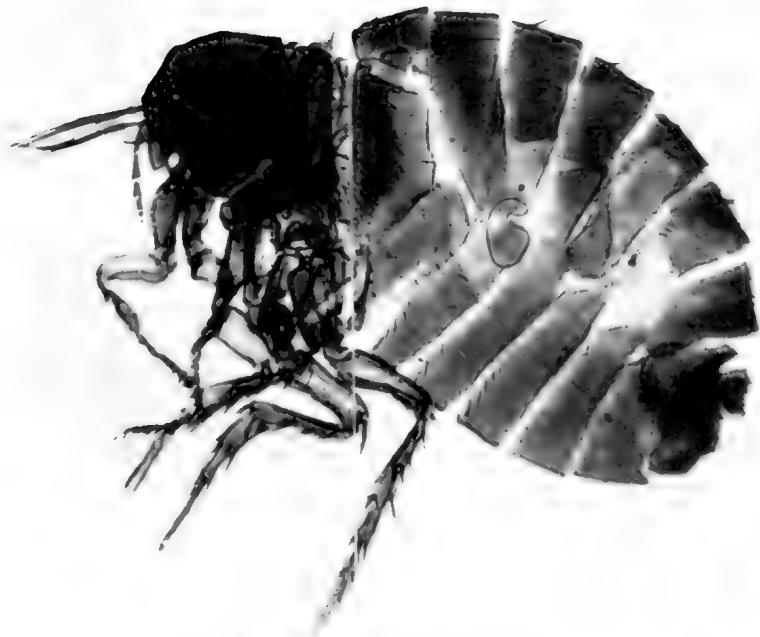
the eaves, or flashes past on swift wing. For three years a pair have nested undisturbed under a verandah which I daily pass, and their judgment as to a site is shown from the fact that the nest is just above a butcher's window. Then a Scarlet-breasted Robin, a rare and ever-welcome visitor, will suddenly, with characteristic flight, perch on the fence or inspect the lawn and be off again. Once a Malurus or Bluetap, with attendant wives, favoured us with a passing call. When figs are ripe, in addition to the Starling, the little sharp-beaked White-eyes will ingeniously eat out the fleshy part, leaving the outer skin apparently intact. Now in spring, at night, we can hear the mournful refrain of the Pallid Cuckoo, whilst the Bronze-Cuckoo may be seen for a moment or two on the telephone wires. Wattle-birds occasionally call harshly from trees in the vicinity. Scarcely a season passes without a visit from the Harmonious Shrike-Thrush, with its rich flood of melody. This bright-eyed songster is as trustful as it is intelligent, and will stay about for a day or two before departing. Very occasionally we hear or see the rollicking Kookaburra from some perch in the vicinity, and Black Swans have been heard at night flying overhead. A pair of Magpies—a bird seldom building a nest amid houses—have for about three years nested in a pine tree not far distant, their return being announced by a matutinal burst of song. Close at hand also a pair of Grallinas for several seasons have returned and built their mud nest, their challenging cries ringing out from time to time.

An introduced songster, the little Goldfinch, now fully acclimatized around the foreshore of the Bay, sometimes visits the garden. Until lately one could rely on hearing, if not seeing, the English Skylark in full-throated song whenever there was an open space of fair size, but building operations are making its presence rare. Escaped Canaries also fly in at odd times. Last year on successive days we captured two, one of which we still have. One afternoon the rarest bird of all arrived in heavy flight upon the lawn in the form of a domestic Goose—a fine specimen. With hopeful visions of an approaching Christmas dinner, I essayed to catch the wanderer, but at the attempt it again rose in flight over the housetops in the direction of Brighton.

Crumbs and broken food are left on the grass for the birds, and in summer a vessel of water is available. Birds soon become confident and fearless when encouraged, their habits and presence affording much pleasure to those genuinely interested.

—CHARLES DALEY, Caulfield.

PLATE X.



THE STICKTIGHT FLEA (*Echidnophaga gallinacea*). x 50.

Photo.-Micro. J. SEARLE.

THE STICKTIGHT FLEA, *ECHIDNOPHAGA GALLINACEA*.

THIS flea, first recorded from India, has spread rapidly through the equatorial belt and overrun the United States. It would be difficult to find a chicken on any farm in the southern and south-western portions of the United States that is not infested with this pest. Unlike other species of fleas, it seldom hops about, but, having selected a suitable host, it inserts its mouth-parts deeply therein, and remains in this position for days or weeks. They attach themselves in dense masses to the comb, gills, and around the eyes of fowls, and it has been found in abundance on dogs, cats, tame rabbits, ducks, and turkeys, as well as on native birds. This pest has recently found its way into Western Australia; and is spreading rapidly through that State; and, as it is not confined to poultry alone, but can live on other birds and small mammals, it is only a matter of time when it will reach Victoria. Young chickens, when badly infected with sticktight fleas, have succumbed to the heavy drain on their vitality, and older poultry get out of condition and the egg supply is diminished; they become droopy, lose appetite, and fall off in weight. The fleas are present on hosts throughout the year, but, appear to thrive best in ill-kept fowl-houses. The eggs are dropped by the female fleas while attached to the host. These fall beneath the roost, hatch, and the young larvæ feed on the excrement of the parent fleas and on other animal and vegetable refuse. The fleas are small and dark brown in colour. The body is short, thick-set, and the legs slender, but the mouth parts are large and strong. The male is usually smaller than the female, and almost black in colour.—J. SEARLE.

BOOK NOTICE.

A CENSUS OF THE PLANTS OF VICTORIA. Published by the Field Naturalists' Club of Victoria. Pp. 105 (4 x 6), crown octavo, with two maps. 3/6.

This little handbook, which has been in preparation for some years, has at last been completed, and is now on sale at 3s. 6d. per copy. It is the result of a tremendous amount of consideration and research, and, as far as the list of plants is concerned, may be taken as correct at the time of publication. It is, perhaps, not what plant-lovers have been looking for, as one cannot find at a glance what the name of any plant is from an inspection of a specimen. It is not a botany; it is mainly a list of the plants of Victoria, with the vernacular names selected for each one by the Plant Names Committee of the Field Naturalists' Club. The task of the committee has

probably been unique, for we doubt whether the selection of vernacular names for the flora of a country boasting over 2,000 species has ever before been attempted. A short preface briefly alludes to the difficulties of the task and the method of compilation. This is followed by three pages of explanatory notes, in which will be found the reasons for certain changes of names, alterations in systematic arrangement, and other details. The largest number of changes will be found in the class Filicales (Ferns), where, owing to the latest determinations, some familiar genera have disappeared; however, as all names previously in use are indexed as synonyms, little inconvenience should be caused. In the Rutaceæ and Euphrasiaceæ several important changes will also be found. A tabular statement of the number of genera and species under the arrangement adopted in the volume, giving totals of 582 and 2,053 respectively, shows that the leading groups are Gramineæ, Liliaceæ, Orchidaceæ, Leguminosæ, Myrtaceæ, and Compositæ.

As the work is intended to be used in conjunction with Mueller's "Key," his systematic arrangement is also given. The census occupies sixty-nine pages, and gives the name of every species, with its page in Mueller's "Key" or other work where described, the vernacular name adopted, its regional distribution in Victoria, and (in the case of plants occurring within thirty miles of Melbourne) a further reference to the class of country in which they are found. A list is given of plants erroneously recorded for Victoria, of which no authentic Victorian specimens can be traced. A list of the naturalized alien plants occupies ten pages. Finally, separate indices are provided for families (the term "order" being superseded by the latest authorities), genera, and vernacular names. Two maps are included, one of Victoria showing Mueller's geographical districts, and the other of the Melbourne district, covering a radius of thirty miles from the C.P.O. This map bears indications showing the geological nature of the country, thus acting as a guide to the habitats of the plants. The work is a valuable addition to the botanical knowledge of the State, and we trust the vernacular names given will be adopted by all plant-lovers and students, so that in course of a few years unanimity on this point will be established. The volume fills a decided want, and it is hoped may lead to the publishing of an illustrated botany of Victoria. At present beginners in any branch of natural history (except birds) are discouraged by the absence of local works of reference, the great expense of publication and the comparatively limited demand for such works being no doubt responsible for their absence from our bookshelves. The printing, which was done by Walker, May and Co., is clear and well carried out.

The Victorian Naturalist.

VOL. XL.—No. 7. NOVEMBER 8, 1923.

No. 479.

FIELD NATURALISTS' CLUB OF VICTORIA.

The monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 8th October, 1923.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about fifty members and friends were present.

REPORTS.

A report of the excursion to Frankston on Saturday, 15th September, was forwarded by the leader, Mr. J. W. Audas, F.L.S., who reported that, owing to unfavourable weather, the excursion was poorly attended. A direction was taken through the Park Reserve, where a number of familiar shrubs were seen in full bloom. The Jungle Sunflower, *Osteospermum moniliferum* (indigenous to South Africa), a rather handsome shrub with large yellow flowers, was noticed to be spreading in the district. Returning to the township by a different route, the local flower show was visited, where Mr. A. E. Keep and himself were invited to judge the wild-flower exhibits, which they did, and were pleased to see the display made by the local flowers, of which at least one hundred species were represented. Later a visit was paid to the State Forest Pine Reserve, about two miles north-east of Frankston. Here the Remarkable or Monterey Pine is doing well, many of the trees being upwards of thirty feet in height. Some fine bushes, fully ten feet in height, of the Silky Hakea, *H. acicularis*, were noted here, covered with their white blossoms. The Austral Indigo, Golden Goodia, and the Leper and Sweet Acacias were all seen in full bloom. On the way to the Seaford railway station a number of orchids were noted, of which the Nodding Greenhood, *Pterostylis nutans*, Maroon Hood, *P. pedunculata*, and the Snake Orchid, *Diuris pedunculata*, were the most interesting.

A report of the excursion to Cheltenham on Saturday, 22nd September, was, in the absence of the leader, Mrs. E. Coleman, given by Mr. C. Daley, F.L.S., who said that an enjoyable outing resulted, but no unusual species had been noted. About a dozen kinds of orchids had been seen, of which *Lyperanthus nigricans* was the most interesting.

A report of the excursion to Bendigo on Saturday, 6th October, was given by the leaders, Messrs. Daley and Paton, who said that the party had been favoured with fine weather. They had spent the first afternoon at Epsom, and the Sunday at Mandurang, to the south-east of the city, where flowers of many kinds were in great abundance.

A report of the excursion to Keysborough on Saturday, 13th October, was given by the leader, Mr. H. B. Williamson, F.L.S., who said that, on leaving the train at Noble Park station, the road towards Keysborough was taken, but time did not permit of going the whole distance. Working through some scrub, a number of interesting flowers were met with. The Wedding-bush, *Ricinocarpus pinifolius*, three species of Guinea-flower (*Hibbertia*), and the Common Flat Pea, *Platyllobium obtusangulum*, were at their best. Nine species of orchids were noted, including the Red-beak Orchid, *Lyperanthus nigricans*. Among the plants gathered on some low-lying land recently submerged were the Water Blinks, *Montia fontana*, and the Pink Bladderwort, *Polypompholyx tenella*, the latter interesting on account of the insect-trapping vesicles on its roots. It was noted that *Watsonia meriana*, Bugle Lily, a South African importation, is rapidly becoming a pest in the district. A very fine Red Gum, *Eucalyptus rostrata*, growing in the railway reserve, was much admired, and hopes were expressed that "Old Noble" would long remain to witness the passing trains and the growth of the new suburb.

EXHIBITION OF WILD-FLOWERS.

The chairman gave a brief report on the exhibition of wild-flowers held at the Town Hall on 3rd inst. He said the exhibition had not been quite so largely attended as in some previous years; still, it was anticipated that when the accounts were closed there would be a fair sum to divide with the Victorian Bush Nursing Association. The rough weather of the week-end had probably militated somewhat against the display, but this was hardly noticeable except to expert eyes. He claimed that the exhibition would rank as one of the most successful yet held.

Mr. F. Pitcher added his congratulations on the success of the exhibition, and moved—"That the best thanks of the Club be accorded to all donors and exhibitors of flowers; to all members and their friends who so willingly and ably assisted the ladies' special committee and the general committee with their services on the day of the exhibition; to Messrs. Keep Bros., for their great kindness in lending their motor, with driver, for the whole day for the purpose of collecting consignments of flowers at the several railway stations; to the Victorian Railways for facilitating the despatch and delivery of consignments; to the Tourist Bureau officials; to the National Museum, for the loan of jars; to the *Argus*, for press notices; to the *Age*, for paper for covering tables; and to the Victorian Bush Nursing Association, for obtaining flowers from distant localities for the exhibition."

This was seconded by Mr. F. G. A. Barnard and carried unanimously.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. Thos. Kerr, Box 2,515, Spencer-street P.O., Melbourne; Mr. J. R. Leslie, 4 Lara-street, South Yarra; Rev. E. Nye and Mr. Edward E. Nye, 169 Punt-road, Prahran, were duly elected members of the Club.

GENERAL BUSINESS.

The chairman announced that the long-promised "Census of Victorian Plants, with Their Vernacular Names," was now available to members.

Mr. G. Coghill considered that the members of the Plant Names Committee, who had given so much time to the consideration and compilation of the "Census," deserved the congratulations of the Club on the completion of their task. He moved that specially bound copies of the "Census" be presented to each member of the committee as mementos, specially referring to Dr. C. S. Sutton, Mr. H. B. Williamson, and Mr. P. R. H. St. John as having taken a prominent part in the work.

This was seconded by Mr. J. L. Robertson, M.A., and carried by acclamation.

REMARKS ON EXHIBITS.

Mr. F. G. A. Barnard called attention to his exhibit of a pot-grown specimen of the Meadow Moonwort, *Botrychium (ternatum) australe*, R. Br. This plant he had collected in the Oakleigh district some thirty years previously, and it had been exhibited on several occasions at the Club meetings. It was a deciduous plant, sending up its new fronds in February of each year. This season the first fronds sent up had been eaten off by slugs or wood-lice, but by isolating the pot in a pan of water he had managed to save two subsequent fronds when they made their appearance. This year it had produced both fertile and infertile fronds; often only the latter appear, but never has it produced more than two fronds at one time in a season.

PAPER READ.

By Mr. D. Paton, entitled "The Plants of the Whipstick, Bendigo."

In the absence of the author the paper was read by Mr. C. Daley, B.A. The author, in a comprehensive paper, described the characteristics of the Whipstick flora, illustrating his remarks by dried specimens and a map of the area dealt with. This extends to the north-west of Bendigo, from near Eaglehawk to Kamarooka, covering about sixty square miles.

The paper was discussed by Messrs. Williamson, Daley, Oke, and Dr. Sutton.

EXHIBITS.

By Mr. J. W. Audas, F.L.S.—Specimens of *Anguillaria (Wurmbea) divisa*, R. Br., Early Nancy, showing great variation in colour, while some of the flowers measured three-quarters of an inch across; collected at Beechworth, September, 1923.

By Mr. F. G. A. Barnard.—Growing plant of *Botrychium australe*, with sterile and fruiting fronds.

By Mr. C. Daley, F.L.S.—Photographs of Canberra and surrounding district.

By Mr. J. E. Dixon.—Cabinet drawer containing 112 species of Hemiptera—ground and tree bugs—mostly Victorian.

By Mr. C. Oke.—Gizzard (proventriculus) of a weevil, under the microscope.

By Mr. D. Paton.—Plants from the Whipstick; also map (in illustration of paper) of area dealt with.

By Mr. E. E. Pescott, F.L.S.—Growing plant, in flower, of a South African orchid, *Satyrium coriifolium*, Suss., found as a garden escape in South Australia; *Pterostylis fuscata*, Lindl., a rare species; *Thelymitra epipactoides*, F. v. M., albino form, first record of this form; *Caladenia cordiformis*, Rogers, which was formerly known as *C. Cairnsiana*, F. v. M.

By Mr. V. Pitcher.—Seedling plants of the Erect Clematis, *Clematis glycinoides*, illustrated in September *Naturalist*, and growing in hundreds in his garden at South Yarra.

After the usual conversation the meeting terminated.

EXCURSION TO HEIDELBERG.

PROBABLY owing to threatening weather, the attendance at the pond-life excursion to Heidelberg on Saturday, 8th September, was rather small. Though water was abundant, and the river so high that one of the ponds usually visited could not be approached, the material collected proved to be unusually good. The diatom *Tabellaria flocculosa* was found to be extraordinarily plentiful. Other algae of the following genera were noted, viz.:—*Anabaena*, *Pleurotænum*, *Micrasterias*, *Closterium*, *Cosmarium*, *Staurastrum*, *Euastrum*, *Netrium*, *Spirogyra*, *Zygnema*, *Debarya*, and *Bulbochæte*. Of Protozoa special mention may be made of two uncommon Euglenids—viz., *Euglena texta* and *Amblyophis viridis*. A number of Vorticellæ were green with a contained symbiotic alga. Other Protozoa noted were *Amæba proteus*, *Acanthocystis (?) erinaceus*, *Actinophrys sol*, *Centropyxis aculeata*, *Arcella discoides*, *Dinobryon sertularia*, *Astasia tricaphora*, *Phacus (?) triquetus*, *Pandorina*

morum, *Gonium pectorale*, *Monosiga*, sp., *Rhipidodendron huxleyi*, *Uvella virens*, *Trichelomona hispida*, *Gymnodinium fuscum*, *Paramaecium busaria*, *Laevymaria olor*, *Ophryoglena atra*, *Opercularia*, sp. Rotifers were very numerous. Besides many others, the following were noted:—*Ectesia pilula*, which builds its tube of large pellets of faecal matter; *Malicerta ringens*, *Cephalosiphon limnias*, *Floscularia ornata*, *Furecularia longiseta*, and *Ratulus longiseta*. A very interesting larva, that of a fly, *Corethra plumicornis*, was taken in the "Dairy Pond." This animal, which has been called the "Phantom Larva," by reason of its extraordinary transparency, would be almost invisible but for the dark-looking air-sacs which are situated near the head and tail of the creature. These it has the power of filling from the air dissolved in the water in which it lives. They may be considered as analogous to the swim-bladder of a fish. The somewhat obscure group, *Gastrotricha*, was represented by a species of *Chaetonotus*. Altogether, the afternoon proved a very successful one, and we were well repaid for the time spent on the excursion.—J. STICKLAND.

EXCURSION TO CHELTENHAM.

A FAIR number of members and friends took part in an orchid search at Cheltenham on Saturday, 22nd September. The late rains had retarded the orchid season somewhat, so we made for a portion of burnt scrub off Balcombe-road, where it was thought we might find *Hyperanthus nigricans*, which seems to thrive better where there has been a bush fire. Ten species of orchids were found. *Glossodia major* was very numerous, though not at its best. *Diyris longifolia*, beautiful flowers of which have been found here in past seasons, was particularly stunted. Not one *Pterostylis* was found. *Hyperanthus nigricans* was fairly abundant, though on unburnt areas near by there were many patches of very fine leaves, but no flowers. This condition has been noted in other seasons.—EDITH COLEMAN.

EXCURSION TO BENDIGO.

AGAIN taking advantage of the annual railway picnic, on Saturday, 6th October, about twelve members went to Bendigo, reaching their destination at noon. Augmented by three local nature-lovers, the party proceeded to the Botanical Gardens at White Hills, where lunch was taken, after which the area about two miles east of the Epsom racecourse was visited. The season, as regards flowers, was late here as everywhere, and the ground rather dry, so the display of flowers was not so good as on a

previous visit (*Vict. Nat.*, vol. xxxviii., p. 86). Sixty-seven flowering plants and one fern, *Chilanthus tenuifolia*, were noted. *Olearia teretifolia*, *Eriostemon obovatus*, and *Crevillea laevigata* were the most in evidence. Twelve orchids were found, among which were *Thelymitra Macmillani*, some fine Spiders, *Caladenia Patersonia* and *C. testacea*, some with scented, others with scentless flowers, the reason for the difference not being obvious. *Glossodia major* and *Diuris pedunculata* were abundant, and in bright flower.

Next day, a char-a-banc being hired, a visit was made to South Mandurang, where conditions were much improved for collecting (*Vict. Nat.*, vol. xxxix., p. 34). The country was looking its best. A fine feature was the beauty and freshness of the Fairy Wax-flower, the distinctive flower over the anti-serous areas in the Bendigo and Castlemaine districts. There is a danger, owing to the popularity of this dainty flower, of its disappearance from some habitats. Already it has receded some miles from where it was formerly obtainable, the motor-car and the flower-seller being incidentally its greatest enemies. *Tetralobea ciliata* was much brighter and better than at Epsom. Camp was made beside the Malmesbury water-race, in the vicinity of which there was a fine display of flowers. Thinning out the forest reserve has made changes, but the sward, unusually green, was dotted with daisies, golden buttercups, *Anguillarias*, Sunrays, and many orchids, especially *Glossodia major*, in varying shades of pale blue to purple. *Diuris maculata* was also abundant. No less than twenty-one orchids were found, making twenty-five for the two days—an excellent record for Bendigo. The most interesting were the little *Diuris palustris*, with grassy leaves, probably a new find in this district, some specially fine red Spiders, a few specimens of *Diuris palachila*, and *Thelymitra ixioides*. A tall *Thelymitra*, which may be *T. grandiflora*, was also found. Other flowers obtained were mostly as mentioned before (*Vict. Nat.*, vol. xxxix., p. 34). Eighty-six species of flowering plants were seen, also two ferns—a creditable total for this area. Some of the party proceeded about two miles and a half along the water-race towards Big Hill, and, diverging, were rewarded, on the ascent of a contiguous spur, with a splendid panorama—the One-Tree Hill Ranges in the near distance, and, beyond, Mounts Camel, Ida, and Pleasant, near Heathcote, with intervening hills and plains over which the fitful sunshine came and went. Southwards, masses of cloud and some rain obscured the view, but Mount Tarrengower, to the south-west, stood out plainly, whilst southward Mount Alexander reared its massive shoulders above the smaller hills. The open, park-like aspect of the granite hills and slopes on the one side showed a marked contrast

with the more thickly and differently-timbered ranges of the auriferous measures on the other. A most enjoyable day was spent, the heavy and widespread rain avoiding the excursionists.

Mr. J. E. Dixon, who went out to Myers' Flat in search of insects, reports that beetles were very scarce. Most of the shrubs in that locality had finished flowering, with the exception of the Gold-dust Wattle, on which the Ladybird, *Paropsis perplexa*, could be taken in hundreds. Other coleoptera taken were:—Buprestidae—*Stigmodera elongata*, Macleay, *Mclobasis verna*, Hope, *M. rotundicollis*, Blkb., *M. sp.*; Curculionidae—*Acantholophus adelaide*, Waterl., *Leptops Hopei*, Fab. (Mallee variety); Cistelidae—*Atelconis pulchra*, Bates, *Anaxo*, sp.; Elateridae—*Abelus australis*, Cand.

The following twenty-five species of plants not previously listed on these excursions are enumerated:—

SCENCHIZIERTIACEÆ—

Triglochin procera.

JUNCACEÆ—

Luzula campestris.

ORCHIDACEÆ—

Thelymitra ixoides.

T. carneæ.

T. longifolia.

Cyrtostylis reniformis.

Caladenia angustata.

C. dilatata.

C. Patersoni.

C. testacea.

Diuris palustris.

Pterostylis cyanocephala.

Urticaceæ—

Parietaria debilis.

Crassulaceæ—

Crassula Bonariensis.

LEGUMINOSÆ—

Dillwynia hispida.

Goodia lotiliola.

STACKHOUSIACEÆ—

Stackhousia limatifolia.

DILLENIACEÆ—

Hibbertia linearis.

MYRTACEÆ—

Melaleuca ericifolia.

HALORRHAGIACEÆ—

Myriophyllum intermedium.

SCROPHULARIACEÆ—

Euphrasia collina.

GOODENIACEÆ—

Goodenia elongata.

COMPOSITÆ—

Leptorrhynchus elongatus.

Helichrysum scorpioides.

Helipterum incanum.

D. J. PATON.

CHAS. DALEY.

EXHIBITION OF WILD-FLOWERS.

THE annual exhibition of wild-flowers was held in the Melbourne Town Hall on Wednesday, 3rd October. Owing to the unusual lateness of the season and the inclement weather experienced for a few days before, the display was hardly equal to some of its predecessors. One collector had the unique experience of passing through a snow-storm on his way to the district he had chosen for his collecting-ground.

The attendance of the public was not quite so large as at some previous exhibitions, but this must not be taken as evidence of diminished interest in the exhibition, but rather as the effect of counter attractions. It had, however, its

advantages, as those who attended were able to obtain a better view of the various exhibits.

The exhibition was opened by the Hon. H. S. W. Lawson, Premier of Victoria. In introducing Mr. Lawson, Mr. Chas. Daley, B.A., F.L.S., president of the Club, stated that one of the main objects of the Club was to create an interest in the native fauna and flora of Victoria, and thus in that of Australia. Opportunity was taken once a year to bring prominently under the notice of the public the beauties of the wild-flowers of the State by means of an exhibition such as the present, and by its means to incidentally add to the funds of some deserving institution. This year the Victorian Bush Nursing Association had been chosen, which, he thought, was a happy idea, as from the bush in various directions were received the flowers on the tables in the hall. It might be of interest to state that since the inception of these exhibitions in 1916 (when the profits were handed over to the Y.M.C.A. for its soldiers' work) nearly £1,000 had been raised by this means for special objects of a philanthropic nature. The proceeds of the 1920 exhibition had been set aside for the publication of a handbook relating to Victorian botany, and this little volume had now been completed, and was for sale in the hall.

The Premier, Mr. Lawson, in declaring the exhibition open, said that in his opinion the Field Naturalists' Club deserved the thanks of the community for having, in this and other ways, inculcated a love of the beautiful and a spirit of research. A token of the interest taken by the public was the large attendance present that afternoon. To leave work and indulge in aesthetic tastes was of undoubted benefit, and at the same time helped to stimulate interest and scientific research—an action which must be of ultimate benefit to the individual. He congratulated the Club on the beauty of its exhibition and the practical nature of its efforts.

The first display to catch the eye on entering the hall was a fine collection of flowers from the Grampians, the result of a special visit made to that district by Mr. G. Coghill, who is also an enthusiastic grower of native flowers. Here were to be seen masses of the Native Heath, *Epacris impressa*, in various shades, from deep crimson to the purest white, Grevilleas, various pea-shaped flowers, myrtaceous flowers, and many others, the whole forming a very imposing display.

To show that Australian plants are capable of improvement and development, the acting director of the Melbourne Botanic Gardens, Mr. W. Laidlaw, B.Sc., had forwarded about forty varieties of cut flowers of distinctive Australian plants in cultivation at the Gardens. These were effectively staged and labelled in front of the platform by Mr. P. R. H. St. John,

and included:—*Acacia montana*, V., *A. leprosa*, V., *Bauera rubrioides*, V., *B. sessiliflora*, V., *Boronia inornata*, *B. megastigma*, W.A., *Calytrix Sullivani*, V., *Chamaelaucium coccinatum*, W.A., *Chorizema cordatum*, W.A., *C. ilicifolium*, W.A., *Doryanthes Palmeri*, Q., *Eucalyptus erythronema*, W.A., *E. sideroxylon*, var. *fallens*, N.S.W., *E. longata*, W.A., *Grevillea acanthifolia*, N.S.W., *G. caleyi*, N.S.W., *Olearia pannosa*, V., and N.S.W., and *Pultenaea daphnoides*, V. and N.S.W.

An interesting exhibit, daintily arranged, and which attracted much attention, was a display of native orchids by Mrs. Coleman and friends. In this eleven genera and forty-two species were represented. Of *Pterostylis* there were twelve species, *Caladenia* eleven, *Diuris* five, *Thelymitra* four, *Calochilus* and *Lyperanthus* two each, and *Chiloglottis*, *Cyrtostylis*, *Surcochilus*, *Corysanthes*, *Acianthus*, and *Glossodia* one each. Thirty-eight of the species were collected at Healesville, Blackburn, and Cheltenham. Of several of the species large numbers were shown, while separate groups were made of typical specimens of *Pterostylis* and *Caladenia*. Included in the exhibit was a *Calochilus* from Rushworth which may prove to be a new species.

Among the flowers exhibited on the various tables were a number which are worthy of special mention. From Annuello (N.W.) came *Olearia magniflora*, Splendid *Olearia*, and the two *Halga*rias, *H. cyanea* and *H. tauranulacea*; from Bolton (N.W.) the Pink Velvet-bush, *Lasiopteratum Behrii*; from Dingee State school and Eruu (N.W.), fine supplies of *Swainsona procumbens*; from Diapup (N.W.), *S. oncinotropis*; from Mildura (N.W.), Nardoo, *Marsilea Drummondii*, shown in water with fronds floating, the curious Mouse-tail, *Myosurus minimus*, and the Small-leaved *Swainsona*, *S. microphylla*; from Underbool (N.W.), the Austral Hollyhock, *Lavatera plebeja*; from Ouyen (N.W.), *Cassia crenophila* and *C. Sturtii*, *Prostanthera aspalathoides*, Scarlet Mint-bush, and *P. chlorantha*, Green Mint-bush; from Tempy (N.W.), the Orange Immortelle, *Waitzia acuminata*; the Slender Monkey-flower, *Mimulus gracilis*, the Desert Hop-bush, *Dodonaea stenorhiza*, also came from the north; from Bairnsdale (S.E.), *Hakea crenata*, *Smilax australis*, *Leucopogon juniperinus*, *Solanum prangelium*, and *Phyllanthus Gunnii*; from Moe (S.E.), *Tecoma australis*; from Lima East (N.E.), *Swainsona plagiotropis*, Red *Swainsona*.

In response to the request of the Club, flowers were sent from several of the Bush Nursing Association centres.

Flowers were received from a wide range of localities, and again packages were received without indication of name of sender. The following are the localities recorded and the name of the sender, where known:—

North and North-West.—Annuello, W. Chapman; Bolton, F. Holt; Emu, bush nurse; Gumbower, B.N.; Kerang, Miss English; Mildura, H. B. Williamson; Nullawill, B.N.; Ouyen, Rev. and Mrs. Pryor; St. Arnaud, Miss English; Tempy, B.N.; Underbool, E. Cruise; Wimmera—Diapur, Mrs. Hensley.

South-West.—Harrow, Nurse Crake; Grampians, G. Coghill, C. D'Alton; Stawell, J. A. Hill.

Bendigo.—Bendigo, D. J. Paton; Dingee, Mrs. Grylls, State school; Maldon, Mrs. Brooks, J. C. Goudie; Taradale, Mrs. Hemsford; Tandarra, ———

North-East.—Girgarre, J. Vines; Lima East, Miss Evans; Rushworth, Mrs. Rich.

South.—Black Rock, Miss Nokes; Belgrave, F. Pitcher; Camberwell, Master J. Pescott; Croydon, Nora and Eric Sedgwick; Drysdale, D. K. Whyteron; Emerald, W. Scott; Greensborough, H. Ford; Hampton, A. Lyne; Lower Leigh, State school; Mount Dandenong, Miss Nokes; Mount Dandenong North, Miss S. Kinvig; Meredith, B.N.; Pakenham, F. Wisewould; Paradise, ———; Red Hill, Mrs. Higgins; Ringwood, Mrs. Matthews; Somerville and Tyabb, L. Thorn.

Gippsland (S.E.)—Bairnsdale, T. S. Hart; Boolarra, State school; Drouin, Mrs. Dyatt; Heyfield, Mrs. Macfarlane; Lardner, Miss K. Currie; Moe, C. Lewis (?); Tyers, Miss Galbraith.

Flowers were also received from other States. The Barrier Field Naturalists' Club, Broken Hill, N.S.W., forwarded a fine lot of Sturt's Desert Pea, *Chanthus Dampieri*, which found ready sale after the exhibition, also about a dozen species characteristic of the district. Mr. E. Ising, hon. sec. Field Naturalists' Section, Adelaide, S.A., forwarded about thirty species from the Mount Lofty district; and Mrs. Brookes, Perth, W.A., forwarded Kangaroo Paws and other Western Australian flowers.

A nice collection of cultivated indigenous flowers was forwarded by Mr. J. M. Watson, of "Maranoa," Balwyn, also by the Misses Currie, Lardner, via Dronin, Mr. G. Coghill, Mr. A. S. Blake, Morgan Bros. (Clayton), and others.

Quantities of foliage and fruiting branches of Eugenias were forwarded by the Director of the Botanic Gardens for decoration purposes, while a number of pot specimens of native plants found ready sale, and, with the sales of bunches of flowers and of Waratahs from New South Wales, helped to swell the takings considerably. These sales were conducted by a ladies' committee under Miss A. Fuller, while Miss H. Gabriel and a number of lady friends undertook the conduct of the refreshment department.

As far as can be ascertained at present, there will be a surplus of about £100 to divide between the Club and the Bush Nursing Association.



CRAVATTA: NATURALIST FROM THE SOUTH.

Photo, SPURR

CRADLE MOUNTAIN (TASMANIA) AND ITS FLORA.

BY C. S. SUTTON, M.B.

(Read before the Field Naturalists' Club of Victoria, 13th Aug., 1923.)

There are many beautiful places in Tasmania, some of them little known even to its own people; and not the least of these is the Cradle Mountain, which, thanks to my old friend Mr. Gustave Weindorfer, I have been able to visit on five occasions.

When the first excursion there was made with him, in 1909, there was no track for the last seven miles or so, infrequent blazed trees being the only indications as to the direction to be taken. Though still out of the beaten track—which, indeed, only adds to its charm—this delectable locality is, in reality, now so accessible that a visitor can reach "Waldheim," Mr. Weindorfer's comfortable chalet, on the evening of the day after leaving Melbourne. The way lies from Burnie, by rail, to Sheffield, and thence about forty miles by road through Wilmot, Moina, and the Middlesex Plains. Each year the road from the latter place, across the Pencil Pine Creek and through the valley of the Dove River, is being improved, until it is now quite practicable for vehicles up to the last mile or so. Actually motor cycles have been ridden, or pushed, the whole distance.

The three chief elevations in the district are the Cradle Mountain (5,069 feet), Mount Brown (4,607 feet), and the Barn Bluff (5,115 feet), the last being only a few feet lower than the summit of Ben Lomond, the highest point in Tasmania. These shattered vestiges of the vast dolerite sill which once covered the greater part of the island stand on a plateau about 4,000 feet high, composed partly of Pre-Cambrian schists and quartzites and partly of Permo-Carboniferous sandstone. The first-named, looking like the lower jaw of some prehistoric monster rather than a cradle, is the most picturesque, and consists of a narrow, serrated ridge nearly a mile long, running in a north-easterly and south-westerly direction. On the northern side it is draped with rock falls or scree, up one of which, using both hands and feet, the summit is reached with comparative ease. On the southern side, like the Barn Bluff, it is precipitous, and apparently unscalable. The Bluff looks, indeed, like a barn, and, though higher, is approached more gradually, so that the shorter final climb is less arduous. On its eastern side is a huge rock fall, looking as though a large part of the summit had come away at the one time.

From these two outlooks, on a fine day, there is "wide wandering for the greediest eye." The north coast, from Table Cape to Tamar Heads, can be made out. The workings

and buildings of the famous Mount Bischoff mine can be easily seen, and the smoke from a locomotive on the Emu Bay railway across the Pieman River is visible. All around are mountains and deep gorges. To the north and east the Black Bluff, Mount Roland, and the Western Tiers; to the south, Mount Pelion west, Mount Ossa, the Eldon Range, Mount Reid, and a world of others.

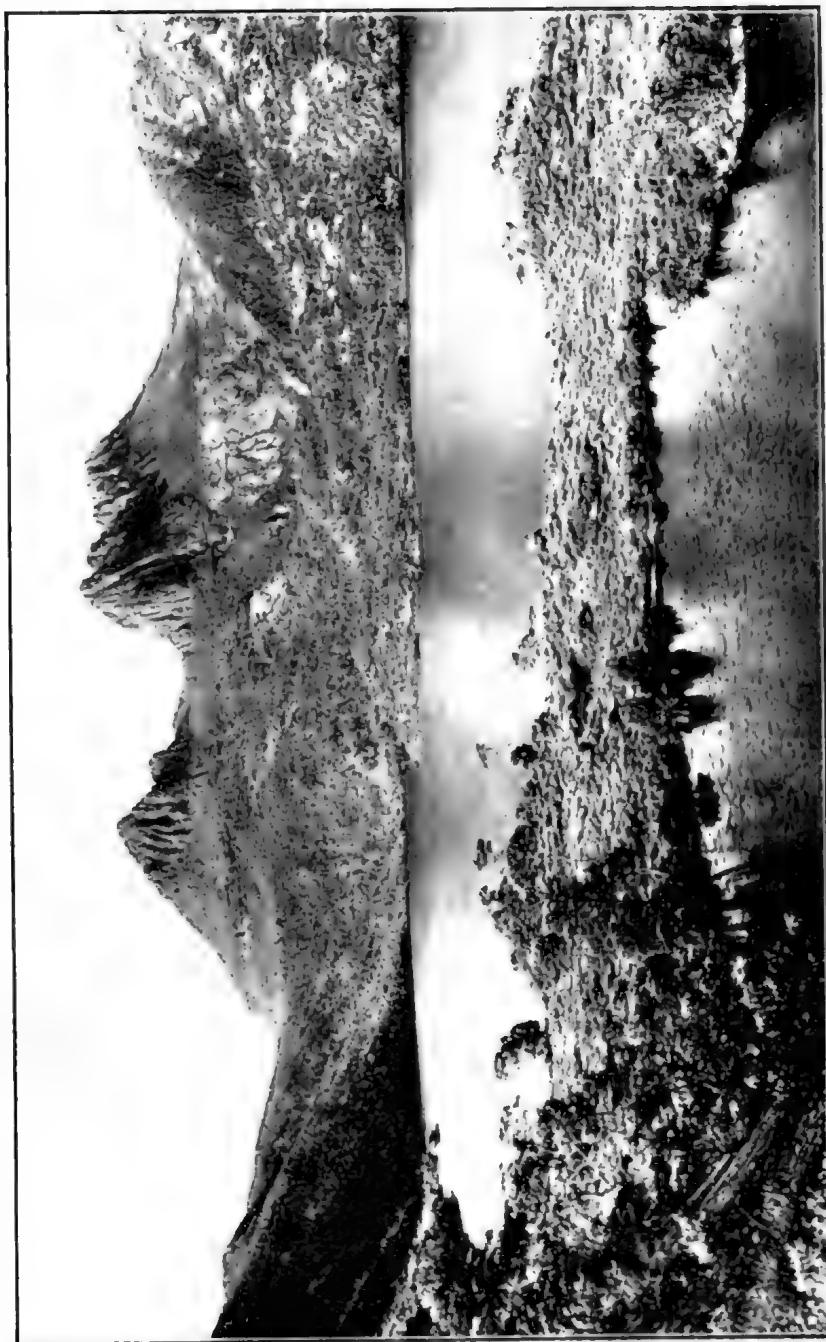
Almost everywhere are evidences of glaciation, referred to Pleistocene times: cirques cut into the plateau, on the floors of which are deep lakes, lakelets, and tarns at different heights in every direction, ice-scored rocks, moraines, and erratics.

Of the larger lakes, the most extensive is the Dove Lake. This very beautiful piece of water, in outline resembling a boomerang, is about a mile and a quartet long, a quarter of a mile wide, and nearly two hundred feet deep. Towards its outlet the banks are low and covered with a short scrub fragrant with Botomia, but the southern shores are steep, and densely clad with forest right to the water's edge. Through this thick mantle of vegetation at the head of the lake, from a source three hundred feet above, tumbles, with ceaseless roaring, an invisible cascade, made from the surplus waters of the tiny Lake Wilkes, perched on a ledge under the Little Horn. Near by lies a cluster of little wooded islets close to the further shore, and here and there around the lake margin are charming little beaches of snow-white, finely-graded pebbles.

Of a very different character scenically is the so-called Crater Lake, set deeply into the northern face of the plateau. At a higher level, it is smaller, but deeper, and pear-shaped in outline. Everywhere the banks are steep, and rise to a height of as much as 500 feet. In certain weather conditions, with an overcast sky and with clouds swirling across its face, it has a truly awe-inspiring appearance; but in others, viewed from above, when its surface, like a dark mirror, is now and again gently stirred, first one way and now another, by faint vagrant breezes, it is a strangely-beautiful sight.

Lake Rodway, on the far side of the Cradle Mountain, has more open surroundings, and, with Mount Brown in the background, has a beauty of its own. It is situated on part of the floor of the great cirque, where once, in Dr. Benson's opinion, was a glacier a thousand feet in thickness, and empties into a great gorge, to feed, like the others, the Forth River.

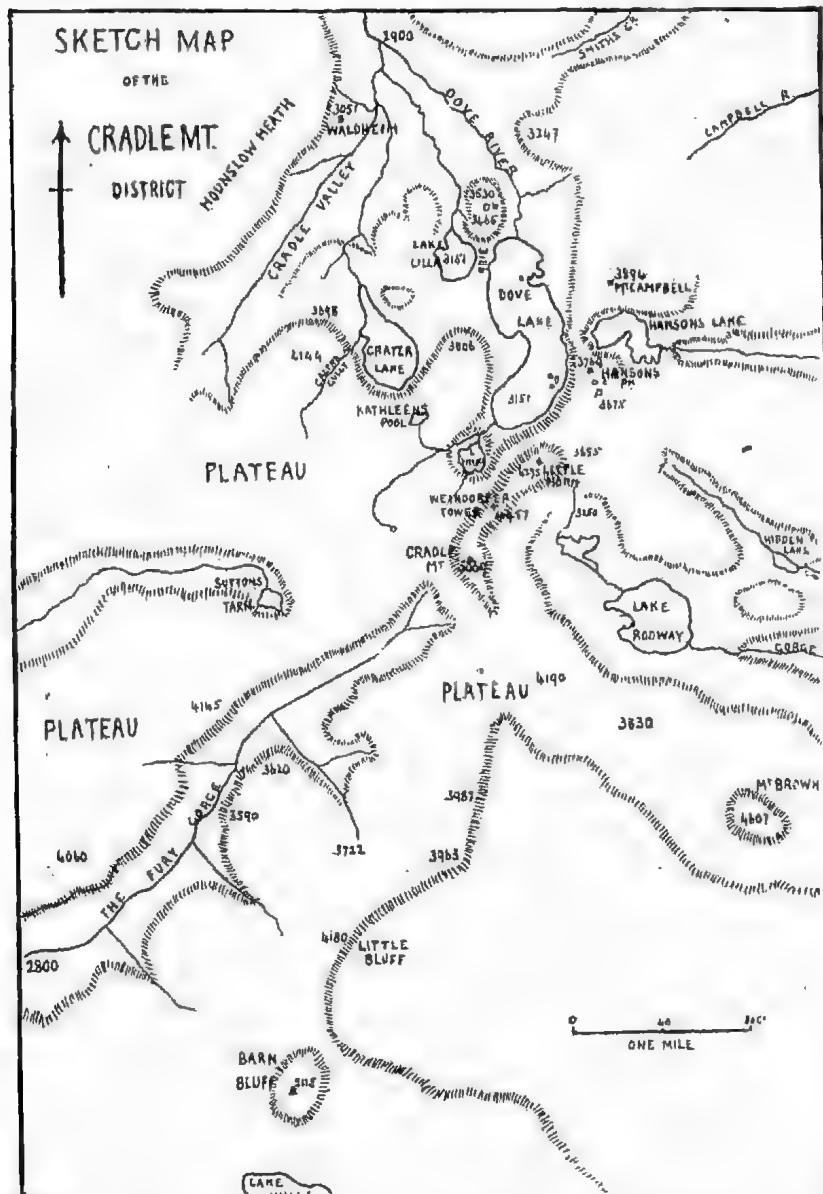
Space will not permit other than bare mention of Lake Hansen, away up between Mount Campbell and Hansen's Peak; the curious Twisted Lakes on the ridge there; the charming Lake Lilla, close to the Dove Lake; the rock pools on the *roche moutonnée* hill between the outlets of the two last mentioned; another among the moraine hummocks, where



CRADLE MOUNTAIN AND DOVE LAKE.

Photo, SPITLING, Launceston.

platypus disport; and the more distant Lake Campbell and Lake Wills.



The precipitations at "Waldheim" are considerable, averaging over 100 inches, and as much as 23 inches was recorded

in May last. January and February are the driest months, and consequently those most favourable for a visit, as the weather is then usually delightful, the temperature rarely exceeding 80°, and the nights correspondingly cool.

Regarding the vegetation—the writer's chief interest—no systematic description of the plant communities can be attempted here. Various types of forest growth, grass-land or sub-alpine meadow, dwarf sub-alpine scrub, "Button-grass," "Gleichenia-Restiu," and plateau associations, each containing its own characteristic set of plants, are plainly distinguishable, and it is hoped that a sketch of these, in the nature of a reconnaissance survey of the locality, may perhaps appear in another place. Here only some impressions can be recorded, some comparisons with our own alpine flora drawn, and references made to the more interesting endemic species.

In the first place, the forest growth covering a great part of the steep plateau slopes sometimes contains no eucalypts at all, and sometimes, though present, they are quite subordinate. Near "Waldheim" there is a large stretch of forest composed mainly of King William Pine, *Athrotaxis*, whose stems are often thickly covered with the very beautiful *Hymenophyllum Malingii*, brown with closely felted hairs, and in lesser degree with *H. tenbrionense*, the Myrtle Beech, and the deciduous Beech, *Nothofagus Gunnii*. With these are, amongst others, *Atherosperma moschatum*, *Pilosporum bicolor*, *Leptospermum lanigerum*, var. *montanum*, the indigenous Waratah, *Telopea truncata*, *Richea pandanifolia*, sometimes attaining a height of thirty feet, with the growth form of *Pandanus* and *Cordyline*, and bearing creamy panicles of flowers concealed in the axils of the leaves; the curious Celery-top Pine, *Phyllocladus*, with leaves reduced to minute scales, their plates being taken by flattened branchlets, and the shrubby *Archeria eriocarpa*, with an abundance of beautiful reddish flowers. Apart from this profound difference in the appearance of the forest, due mostly to the presence of the Pines, of which there are seven species on and around the mountain, and the Richeas, the strongest impressions are created by the great variety of the Epacrids, numbering about thirty; the profusion of composites, chiefly *Olearias* and *Helichrysum*, about fifteen in all of these being endemic; the abundance of liverworts, lichens, and mosses; the huge beds of *Sphagnum* in the valleys; and the curious "cushion" plants of the plateau. One is struck also by the paucity in species of leguminous plants. Although *Pultenaea subumbellata* occurs at the edge of Hounslow Heath, just above the valley, and *P. juniperina* and *Bossiaea cordigera* in the Dove Valley, only

Oxylodium ellipticum—just as is the case at Kosciusko—reaches above the tree line.

Amongst a total of about 250 species in all noted, about 150 are found in our Alps. In the forests we are already familiar with *Drimys*, *Gaultheria hispida*, *Cyathodes acerosa*, and others already mentioned, but there are also many most attractive endemic species.

In the mixed *Eucalyptus* and *Athrotaxis* forest, on the margin of which the chalet is situated, are many fine shrubby Epacrids. *Trochocarpa disticha* has pinkish flowers in short, dense terminal spikes, and fleshy purple fruits about half an inch in diameter. *T. thymifolia* has red flowers in nodding spikes and pale purple fruits of about the same size. *T. Gunnii*, white flowers, also in spikes, and rather smaller, purplish to orange fruits. *Cyathodes acerosa* is abundant, with red fruits. *Richea scoparia* bears torch-like red spikes, and *R. sprengelioides* yellow ones, both with stiff, pungent leaves like our own *R. Gunnii*. On the margin of the forest are fine large bushes of *Olearia pinifolia*, quite six feet high, with rounded pungent leaves and a wealth of snow-white blossom. Other forest species are *Eucryphia Billardieri*, so far seen only on the far side of the Dove Lake, near the water's edge, *Cenarrhenes nitida*, *Anodopetalum biglandulosum* (the notorious "horizontal"), and a very beautiful Epacrid, *Archeria serpillifolia*, flowering most profusely, and very fragrant.

In the sub-alpine meadow, mostly composed of the tussocky *Poa cespitosa*, with a sprinkling of ten or twelve other grasses, *Carpha alpina*, *Elymanthus capillaceus*, and *Lazula campestris*, are fine clumps of *Gentiana saxosa*, *Diplarrhena*, and many composites, such as *Celmisia*, *Craspedia Richei*, *Podolepis acuminata*, *Helichrysum scorpioides*, *Halicterum incanum*, *Lagenophora Billardieri*, and *Helichrysum bracteatum*, this last presenting a most beautiful sight, with colours ranging from light gold to bronze. Almost the only novelties here are the tiny prostrate *Rubus Gunnianus*, with handsome varnished leaves, large white or yellowish flowers, about three-quarters of an inch in diameter, and bright red fruits, and the still smaller *Coprosma Moorei*, bearing a large blue berry, one-third of an inch long.

In the dwarf scrub occupying the lower part of the valley and a good area of the slopes, *Oxylodium ellipticum*, *Epaeris lanuginosa*, *E. microphylla*, *E. serpillifolia*, *Hibbertia angustifolia*, *Melaleuca squamea*, *Comesperma retusum*, *Patersonia glauca*, and *Calostrophus lateriflora* are soon recognized. The endemics chiefly helping to compose this association are *Bellendena montana* (recently figured in the September number of the *Naturalist*), *Baeckea leptocaulis* (differing from *B. Gunniana* only

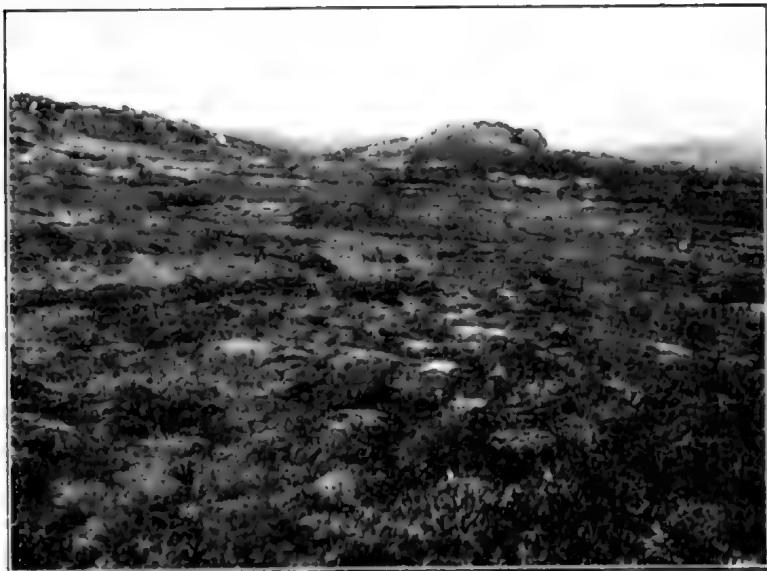
in having five instead of seven to ten stamens). *Boronia citriodora* (which gives off a delightful fragrance of lemon-thyme as one walks through it). *B. rhombifolia* easily distinguished by its round leaves, and a small *Leptospermum*, *L. rupestre*. Less conspicuous but even more interesting members are *Campynema lineare*, an iris about six inches high, with small greenish flowers and bright red anthers, long considered monotypic until another was recorded from New Caledonia three years ago; the smaller composite *Abrotanella scapigera*; and the minute *Aclinothos bellidioides*, and *A. suffocata*, not an inch high, and suggesting no kinship with the handsome Flannel-flowers of New South Wales.

Growing in a corner of the Dove Lake, within a few inches of the water, and not noted elsewhere, is the slender little *Forstera (Phyllacne) bellidifolia*. It has a dense rosette of leaves and a stem a few inches long, bearing one or two tiny white flowers, and belongs to a genus consisting of few species, found principally in New Zealand and the extreme south of South America. Another waterside plant, though it also grows amongst the rocks of the plateau, is the handsome *Blandfordia marginata*, a lily with clusters of flowers quite an inch and a half long; of a brownish-red outside and yellow inside. This genus also has representatives in New South Wales.

Coming now to the plateau, we meet with other familiar species—*Ranunculus Gunnii*, *Stylium graminifolium*, *Euphrasia Brownii*, *Drosera arcturi*, *Dichosciadium (Azarella) ranunculaceum*, *Astelia*, *Blechnum penna-marina*, *Gleichenia dicarpa*, and *Caltha*—the last thick-set in mats with *Diplaspis cordifolia* in one gully only.

The plateau (see Plate xiii.) has all the characters of a fell-field, and the growth, except in sheltered places, is not much more than a foot or so high. The Podocarps of our mountains is here associated with *Microcachys*, another dwarf pine, sometimes quite prostrate from the violence of the winds. From amongst this appears the beautiful *Anemone crassifolia*, the only representative of the genus in Australia, with white flowers as large as the garden variety. The two *Heucheras*, *H. Milliganii* and *H. pyramidalis*, with pinkish bracts, are Everlastings. Another composite, *Ozothamnus ledifolius*, was thought to be peculiar to Tasmania until Mr. Cambage discovered it a few years ago on Bimberi Peak, in the Federal Capital Territory. *Miligania densiflora* is a handsome lily with a profusion of creamy flowers on a stout stalk, growing in the gullies just off the plateau, and not very common. Still less frequent is an Antarctic species, *Omisia integrifolia*, growing in crevices of the dolerite high up, and *Aciphylla procumbens*, unlike those on the mainland, in dense mats on ledges in the same situation. Most of the plants are markedly sclerophyllous, instances being *Richea acerosa* and the two others before-mentioned, two *Orites*

PLATE XIII.



THE "CUSHION-PLANT" ASSOCIATION. CRADLE MOUNTAIN.



Ewartia meredithæ (F. v. M.), Beauverd.

Photos. C. S. SUTTON.

with stiff, pointed leaves. *Sprengelia incarnata*, very much dwarfed, *Cyathodes straminea*, *C. glauca*, and *C. adscendens*. One fine *Pimelea* with silky, silvery leaves is abundant in certain places.

Many others might be mentioned, for there are well over 120 species on the plateau, many of those occurring in the lower situations also appearing here; but space will not permit further references except, very shortly, to the most characteristic feature of the flora in this station—the *cushion* plants—which cover wide areas, sometimes on bare rock, and again in wide, shallow valleys, where they are half-smothered by a dense growth of prostrate *Microcachys*. These curious growths, which have their counterparts in New Zealand and Antarctic South America, but are missing from Australian mountains, might be better described as "boulder" plants, for they are nearly as hard. They dominate the vegetation of the plateau, which has all the characters of a *fell-field*. Mostly they are rounded, about a foot (more or less) high and one to three feet across, but on rocky surfaces they are flatter and more extensive. Two of them, *Dracophyllum minimum*, an Epacrid, and *Donatia novae-zealandiae* (Styliidiaceæ), offer a very perfect instance of epharmonic convergence, or the adoption under the influence of the same extreme conditions, although widely separated systematically, of identical growth forms. They are both dark green, bearing white flowers flush with the surface, and the only outward difference is that the corolla lobes of the former are more spreading. The other two species, not so hard, are composites—*Ewartia Meredithae* (see Plate xiii.), a pleasing russet colour, bearing small "everlastings," and *Pterigopappus Lawrencei*, grey or sage-green, with very minute flowers without spreading bracts. Although usually growing separately, the "cushion" plants are frequently found mixed, all four even being found in one large "cushion," when very curious and beautiful mosaic effects are produced, reminding one of the wool-worked tops of the old-fashioned box ottomans of Victorian times.

The plateau association, which, of course, is not confined to the Cradle Mountain, inasmuch as it contains so many endemic species and so many with Antarctic relations, is of particular interest, more especially to us, seeing it has probably no parallel on the mainland, and it is to be hoped it will not much longer remain without the intensive study it so well deserves.

The sketch map, reproduced from Dr. Benson's paper on "Notes on the Geology of the Cradle Mountain District" (Proc. Roy. Soc. Tas., 1916), will no doubt be useful to plant-lovers and others visiting this paradise for naturalists.

[The paper was illustrated by a large series of lantern slides of scenery, trees, shrubs, and flowering plants.—ED. Vic. Nat.]

BIRD NOTES.

THE YELLOW-TUFTED HONEY-EATER.—Of the thirty-four different species of Honey-eaters inhabiting Victoria, the Yellow-tufted, *Philotis auricomis*, is almost unsurpassable for its beauty. The bright yellow and dark brown feathers contrast so strikingly in the sunshine that it is justly entitled to its place amongst Australia's most beautiful birds. Like most Honey-eaters, it is never quiet, always dashing in swift flight through the scrub or disporting itself amongst the branches of flowering box-trees. The Yellow-tufted Honey-eater is a dweller of the central and northern parts of Victoria as well as New South Wales and Southern Queensland. It is rarely seen south of the Dividing Range, but in the patch of mallee country north of Melton a colony of these birds has been known to exist for many years. They are gradually increasing and spreading over a wide area of that locality. They do not, however, frequent the scrub on the dry hill slopes, but prefer to remain in the vegetation bordering the permanent water-courses. In the valley of the Djeriwarth Creek, just beyond Melton, a nest was found placed in a cluster of flowering Clematis, which made a unique picture for a camera. During the breeding season the birds are very timid, especially when eggs are in the nest; however, once the young ones are hatched the parent birds lose much of their timidity, and will approach quite close to any person who may be near the nest. They possess the usual pugnacious habits of nearly all Honey-eaters in attacking other birds with which they come into contact. The Yellow-tufted Honey-eater has a congener in the Helmeted Honey-eater, *Philotis cassidix*, which is very rare now, and confined only to the scrubs of Gippsland. Though both birds are widely separated from each other, yet at times the Yellow-tufted becomes nomadic and wanders into Gippsland. In October, 1922, a pair was seen in the short tea-tree scrub near the arm of Lake Tyers, at Nowa Nowa. This discovery was quite unexpected, as Gippsland had not previously been recorded as a habitat of this bird.—D. DICKSON.

A FALCON NOTE.—Near the Werribee River, at Melton, on 6th August, 1922, a Little Falcon, *Falco burruulus*, was flushed from a box-tree carrying a bird in its talons. Being anxious to determine the species of the victim, I followed the Falcon from tree to tree. It would seldom fly more than fifty yards before perching again, as its prey seemed a heavy burden, and also militated against its flight. Once, when making a short flight, some Magpies attacked it so furiously that the Falcon dropped its victim, which, on examination, proved to be a fully-grown Rosella Parrot, *Platycercus eximius*. It was practically

plucked of its feathers, and decapitated. After the encounter the Falcon remained in a tree near where the Parrot was dropped, apparently waiting to recover it on my leaving the locality. From this it is quite conclusive that Little Falcons cannot successfully carry birds larger than Parrots; yet, for wantonness, they have been known to kill Ducks and Herons by their tragic striking powers. In cases of such large birds being killed, it may be assumed that they are left on the ground for Crows and birds of prey to feast upon.—D. DICKSON.

THE ADVISORY COMMITTEE ON THE EXPORTATION OF AUSTRALIAN MAMMALS AND BIRDS.—It will be learned with satisfaction that the Minister for Trade and Customs, the Hon. Austin Chapman, M.H.R., has decided to appoint advisory committees in each of the State capitals, to whom all applications for the export of native animals and birds will be referred in the first instance. That for Melbourne is the first constituted, and, until the others are appointed, will act for the whole of Australia. The committee consists of seven members, representing different interests, and seven deputy members, who will act in the absence of the regular member from any unforeseen cause. The Melbourne committee is constituted as follows:—Representing the University and learned societies, Sir Baldwin Spencer, K.C.M.G., F.R.S., and Prof. W. Agar, M.A., F.R.S. (the second name in each case is that of the deputy); Zoological and Acclimatization Society, Dr. Colin Mackenzie and Mr. A. Currie; Museums, Mr. J. A. Kershaw and Mr. G. Hill; Ornithologists' Union, Dr. J. A. Leach and Mr. A. J. Campbell; Field Naturalists' Club and kindred societies, Mr. F. G. A. Barnard and Mr. J. L. Menzies; National Parks Association, Mr. W. F. Gates, M.A., and Mr. R. H. Croll; and Society for Prevention of Cruelty to Animals, Mr. A. T. Latham and Dr. G. Horne. At the first meeting of the committee Sir Baldwin Spencer was elected chairman, Dr. J. A. Leach hon. secretary, and Mr. A. T. Latham hon. assistant secretary. Several matters of importance were dealt with, and it is expected that the export of our native birds particularly will be so regulated that the great waste of life which has been taking place for years past will be greatly minimized.

QUEENSLAND INSECTS.—Lovers of entomology and others who are unacquainted with the wonders of tropical insects should not fail to visit the exhibition of Queensland and New Guinea insects now being shown at the Queen's Hall, Collins-street, Melbourne, by Mr. F. P. Dodd (member of F.N. Club of Victoria), of Kuranda, N. Qld. The specimens are not systematically arranged, as would be done in cabinet drawers,

but rather so as to contrast colours or call attention to points of resemblance or difference, &c., and are, therefore, easily appreciated by all. The collection represents the work of over twenty years, and is probably unique. The patience which has been exercised in arranging some of the cases is also well worth admiration.

FOR MICROSCOPISTS.—An excellent medium for mounting small insects, such as Hemiptera, Diptera, &c., known as Amann's chloralphenol, may be prepared as follows.—Chloral hydrate, 2 parts, phenol (pure carbolic acid), 1 part; mix and liquefy by heat. Kill the specimen in hot alcohol; after a few minutes transfer to the chloralphenol, either in a large drop on the slide or in a small test-tube. This secures clearing and dehydration, when the specimen can be transferred directly to xylol balsam.—J. SEARLE.

THE RED-BACKED SPIDER.—In the October *Naturalist* there appeared a report of the discussion on Mr. S. Butler's paper on "Spiders." I was very much surprised to note that any doubts were expressed by members as to the poisonous nature of the bite of the Red-backed Spider, *Latrodectus scelio*. Some years ago the late Mr. C. Frost investigated this subject and communicated his results to the *Victorian Naturalist*,* in which he gave a number of instances of the severe symptoms resulting from the bite. As a practising medical man I have had to treat persons suffering from the effects of this spider's bite every year for the last twenty years or more, and have been bitten myself. The bite itself is scarcely felt, and there is little local reaction—only a small red spot marking the site. A burning pain soon manifests itself, and in less than half an hour there follow severe darting and lancinating pains in the extremities, mostly in the lower limbs. Unless allayed by morphia, given hypodermically, from $\frac{1}{2}$ to $\frac{1}{4}$ grain being often necessary to make them bearable, they last for several hours, and in a less severe form for days. Cold sweatings, headache, and tremors follow, lasting for sometimes a month before they gradually die away. As a rule, a man is able to resume his usual occupation in a week's time. I have often seen men rolling and writhing with the pain, groaning, and even crying. Severe abdominal pains are sometimes caused, with numbness of the limbs. The symptoms produced are far more severe than those that follow the bite of the smaller venomous snakes. We have large scorpions inhabiting the sand-hills, and centipedes are common: but the bites of either of these are as nothing compared with that of *Latrodectus scelio*.—W. MAGGILLIVRAY. Broken Hill, N.S.W., 11th Oct., 1923.

* *Vic. Nat.*, January, 1891 (vol. vii., p. 140).

The Victorian Naturalist.

VOL. XL.—No. 8. DECEMBER 6, 1923.

No. 480.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 12th November, 1923.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about fifty-five members and visitors were present.

REPORTS.

A report of the excursion to Moorooduc (Mornington Peninsula) on Saturday, 20th October, was given by the leader, Mr. L. Thurn, who said that the attendance was rather small, members perhaps being afraid of the somewhat long walk back to Frankston. However, the outing proved very interesting, and a large number of birds, insects, and plants were noted.

A report of the excursion to Eltham on Saturday, 27th October, was, in the absence of the leader, Mr. W. C. Tonge, read by Mr. A. L. Scott. The report stated that a large number of nests of various birds had been located. Owing to the recent floods not so many birds were seen along the creek as on previous excursions; still, a very interesting afternoon had been spent, and members enjoyed the lovely weather prevailing.

A report of the excursion to Yarra Junction on Saturday, 27th October, was given by the leader, Mr. F. G. A. Barnard, who said that, owing to the distance from town, the winter time-table, which is in use in October, allowed little time for collecting. Half a dozen members joined in the excursion. On reaching Yarra Junction, the Powelltown steam train was taken as far as Black Sands, close to the creek of the same name. Here a variety of interesting flowering shrubs were met with, the most conspicuous of which was *Oxylobium ellipticum*; this was in fine form, bearing masses of deep orange, pea-shaped flowers. The climbers *Clematis aristata* and *Tecoma australis*, Wonga Vine, festooned many of the trees. The Mountain Grevillea, *G. alpina*, the Lemon Crowea, *Asterolasia (Eriostemon) Muellieri (correifolius)*, were attractive small shrubs. Many other plants were noted during a short walk along the creek, but the time was too short for much to be done. The picturesque valleys of various creeks of the district which flow into the Little Yarra would afford good collecting-grounds if they were not so far from town. Two of the party spent the week-end at West Warburton, where, also, in the valley of Yankee Jim's Creek, they were delighted with the fine show made by *Pultenaea daphnoides*, Large-leaf Bush-Pea, and *P. Muellieri*, Fragrant Bush-Pea, which were at their best. On

the lower ground *Dittrichia ericifolia*, Heathy Parrot-Pea, was very attractive.

A report of the excursion to Healesville on Saturday, 3rd November, was given by the leader, Mr. H. B. Williamson, F.L.S., who said that the attendance was very small. The day was spent in the direction of Mount Riddell, and a number of interesting orchids met with. The Bronzy Caladenia, *C. viridescens*, Rogers, and some specimens of a small variety of *C. carneae*, Pink Fingers, with red tips to the sepals, were the first finds. Many specimens of the Common Bird-orchid, *Chiloglottis Gunnii*, were also noted, some being in flower. Further on, *Cryptostylis longisolia*, Large Tongue-orchid, and *Chiloglottis reflexa*, Autumn Bird-orchid, were collected. As it was a likely place for Leek-orchids, *Prasophyllums*, some time was spent in the search for them, with little success. Here the Nodding Blue-lily, *Stypandra glauca*, was in good form, and relieved the monotony of the scrub. A nest of the Yellow-breasted Shrike-Robin was found in a sapling only about five feet from the ground. It had no soft lining, simply dry gum-leaves, on which two unsledged young birds rested. The outside was decorated with hanging strips of bark about four inches long. A resident in the neighbourhood, hearing of our presence, kindly invited us to inspect his garden, where he is cultivating a number of Australian shrubs with great success.

A report of the excursion to the Brisbane Ranges on Saturday, 10th November, was given by Mr. H. B. Williamson, F.L.S., who said that, owing to the distance from town (about forty-five miles), combined with the difficulty of access, the attendance was small, but the results were decidedly interesting. The locality was well worthy of a visit by plant-lovers, especially a little earlier in the season. Those who went were pleased with the outing, and deeply indebted to Rev. A. C. F. Gates, M.A., of Lara, for having come so far from home (forty-five miles) and placed his car at their disposal.

ELECTION OF MEMBERS.

On a ballot being taken, Miss Beatrice Bolton, 10 Shelley-street, Canterbury, and Mr. F. A. Hughes, Poath-road, Oakleigh, were duly elected ordinary members, and Rev. A. C. F. Gates, M.A., Lara, a country member of the Club.

GENERAL BUSINESS.

The hon. treasurer said that he could not give a complete statement re the recent exhibition of wild-flowers, as all the tickets issued had not yet been accounted for, but at present there was a credit balance of about £105. There might, however, be some slight expenditure still to be met. Mr. E. E. Pescott, F.E.S., said that the reason for the absence of flowers

expected from Western Australia was due to a misunderstanding as to the date of the exhibition.

Mr. L. Hodgson referred to the hospitality offered to the members attending the recent excursion to Eltham, and moved that a letter of thanks be sent to Mr. and Mrs. W. C. Tonge. Seconded by Mr. A. L. Scott, and carried unanimously.

PAPERS READ.

1. By Messrs. A. N. Burns and L. Thorn, entitled "Four Weeks' Collecting (Entomology) in Northern New South Wales and Southern Queensland."

The authors gave some account of butterfly-hunting in the scrubs of the Richmond River district, where they had been successful in taking a number of interesting species, as well as larvae and pupae. From Ballina they went to Tweed Heads, and thence by rail to Brisbane. From there a visit was paid to Palmwoods, about sixty miles north, on the Gympie line, this being the nearest station to the Blackall Ranges, celebrated for their wealth of tropical vegetation and insect life. Here, again, they were very successful, and added a number of untaken species to their lists.

In the discussion which followed some interesting remarks were made by Messrs. Daley, Davey, Coghill, and Barnard. Mr. Coghill referred to the glorious vegetation of the Blackall Ranges, and Mr. Barnard to the attractive sight of the large *Papilio* and *Bird-wing* butterflies flying lazily from tree to tree. He also called attention to the exhibition of Queensland insects now being made at the Queen's Hall, Collins-street, by Mr. F. P. Dodd, of Kuranda, North Queensland, a country member of the Club, which would doubtless charm every member who could spare a few minutes for its inspection.

2. By Mr. J. C. Goudie, entitled "Notes on the Coleoptera of North-Western Victoria, Part X."

In this part the author dealt with the Cleridæ, small but handsome beetles frequenting flowers; the Lymexylonidæ, a very small group; the Ptinidæ and the Bostrichidæ, small families of wood-boring beetles which do considerable damage to trees and shrubs, including fruit-trees, also to furniture and domestic utensils.

Mr. H. W. Davey, F.E.S., said he was pleased that a further part of Mr. Goudie's interesting series had been presented to the Club. The author was the first to take up the collecting of "ant-nest" beetles in Victoria, and had recorded a number of interesting species from the Sea Lake district.

Mr. C. Oke referred to the great value of Mr. Goudie's work, but regretted that the intervals between the parts were rather long.

NOTES ABOUT EXHIBITS.

Mr. H. W. Davey, F.E.S., called attention to his exhibit of a millipede and a parasitic worm from Papua, and gave some account of the life-history of the latter. He also exhibited some small ptinid beetles which had bred and lived in cayenne pepper.

Mr. F. G. A. Barnard called attention to the flowering stems of a liliaceous plant from South Africa, which were picked in Capetown about five weeks before, the flowers having developed since arrival in Melbourne.

[This has since been identified at the National Herbarium as the White Star of Bethlehem, *Ornithogalum lactum*, Jacq.—*Ed. Vict. Nat.*]

EXHIBITS.

By Mr. F. G. A. Barnard.—Flowers of *Ornithogalum lactum*, Jacq., White Star of Bethlehem, stems picked at Capetown, S.A., five weeks previously.

By Mr. C. Daley, F.L.S.—Flowering branches of *Olearia (Aster) argophylla*, F. v. M., Musk Daisy-bush, and *Prostanthera nivea*, A. Cunn., Snowy Mint-bush, grown in his garden at Caulfield.

By Geological Survey of Victoria, per Mr. A. E. Rodda.—Pebbles, polished by glacial action, from Inverloch, Vic.; gypsum crystals ("arrowhead type") from Ouyen, N.W. Vic.

By Mr. L. Hodgson.—Spider-orchids, *Caladenia Patersonii*, and Crimson Kunzea, *K. parvifolia*, from Grampians.

By Mr. C. Oke.—Gizzard (proventriculus) of Black Cricket (under microscope).

By Mr. L. Thorn.—Two cases containing fifty-eight species of butterflies and eighty species of moths, collected at Narrabeen, near Sydney, the Richmond River district, New South Wales, and the Blackall Ranges, Queensland, during October, 1922, in illustration of paper; cast skin of tree-snake; leaves of Nettle-tree; pods of Moreton Bay Chestnut; and photographs taken during the trip.

After the usual conversazione the meeting terminated.

A BEETLE NOTE.—*Stigmodera flavocincta*, C. & G.—While investigating the workings of some wood-boring larvæ in the stem of a sapling Yellow Gum, *E. leucoxylon*, I split a section of the trunk, about six inches in diameter, down the centre, and disclosed two examples of this fine Buprestid beetle. Both had perished, having apparently been unable to make their way out through the thick bark. This beetle measures about $1\frac{1}{2}$ inches in length, has the disc of the prothorax black with yellowish margins, and the elytra reddish-brown. Although not a rare species—I often saw it in the Mallee, and it is found in most collections—this record of one of its food plants may be of interest to other collectors.—J. C. GOUDIE, Maldon.

EXCURSION TO MOOROODUC AND FRANKSTON.

ONLY a few members took part in the Moorooduc to Frankston excursion on Saturday, 20th October. Perhaps they were frightened by the prospect of a rather long walk. During the train journey between Frankston and Langwarrin the hills each side of the line were seen to be covered with white flowers, mostly of the Silky Tea-tree, *Leptospermum myrsinoides*, and the Wedding-bush, *Ricinocarpus pinifolius*. On reaching Moorooduc the party followed the track leading to the stone quarry on the side of Mount Eliza. Growing on each side of the track was a fine patch of Swamp Paper-bark tree, *Melaleuca ericifolia*, whose flowers gave off a very sweet scent. A large number of Hymenoptera (wasps and bees) were observed flying around the flowers, also two Nymphalid butterflies, the Red Admiral, *Pyrameis icta*, and the Blue-spotted Painted Lady, *P. cardui kershawi*; the latter were flying about the flowers in large numbers. Passing the engine-house and quarry buildings, we followed the track leading to the top of the mount. This track, a part of the distance, runs by the side of a wooden chute used for sliding firewood down to the mill. On reaching a position on the top of the mount a splendid view of the surrounding country was obtained. On the east the waters of Western Port Bay were plainly seen, and on the west a large expanse of Port Phillip Bay, from Frankston to Ricketts' Point, Beaumaris being visible. Looking south across the Mornington Peninsula we obtained a fine view of the Two Bays nursery. The fields surrounding the nursery were covered with the yellow flowers of the introduced Cape Weed, while large patches of Red Sorrel afforded a pleasing contrast. In the distance was a range of hills terminating at Mount Martha. Working our way down the slope of the mount, three species of small moths of the genus *Philobota* were flying about in large numbers. Four species of orchids were also observed, the most common being the purple Wax-lip Orchid, *Glossodia major*. A pair of Jewel or Flower Beetles of the family Buprestidae were secured on the flowers of the Manuka, *Leptospermum scoparium*. A fine specimen of the Blue-tongue Lizard, *Tiliqua scincoides*, was found basking in the sun. This lizard did not like being disturbed, and resented our presence by opening its mouth and putting out its blue tongue at us. Several other large rough-backed lizards were observed running around the bushes ahead of us. One specimen climbed on top of a post-and-rail fence to get a better view of the intruders; another of the same species climbed a small eucalypt sapling to a height of at least fifteen feet. Finding a shady spot under a Cherry Ballart, we decided to have lunch. Whilst having our frugal repast three welcome strangers paid

us a visit. One, a Harmonious Shrike-Thrush, flew down on the ground beside us to pick up a piece of bread. The second was a Spinebill Honey-eater, which gave us a five minutes' exhibition of preening the feathers on its wings and breast. The other visitor was a White-shafted Fantail, which darted around the cherry-tree, feasting on insects. The Drooping Mistletoe, *Loranthus pendulus*, was very plentiful on the eucalypts on the hillside. The larvæ of the Common Mistletoe Blue Butterfly, *Ogyris olane*, feeds on the leaves of this mistletoe. The larvæ are night feeders, hiding under the loose bark on the trees during the day. After taking the bark off several of the trees with a screwdriver, I found a full-grown larva and a number of empty pupa cases, the perfect insects having emerged. On a large eucalypt tree Common Mistletoe was noted, *Loranthus cestroides*, on which the larvæ of the Scarce Mistletoe Blue Butterfly, *Ogyris abrota*, feed. A couple of Wattle-birds were observed on the bunches of mistletoe extracting honey from the flowers. These birds are fairly plentiful along the coast when the Banksias are in flower, and may be seen in all kinds of attitudes securing honey and catching small insects on the flowers. Until mid-day most of our collecting was done on the slope of Mount Eliza. We then decided to go down to the three-chain road which runs from Moorooduc railway station to the Hastings road, a distance of about three miles. Growing in a paddock on the side of the road we noticed a fine patch of the Silky Tea-tree, *Leptospermum myrsinoides*, in flower, and spent some time searching the flowers for buprestid beetles, without success, although a large number of Hymenoptera (flower wasps of the family Thynnidae) and three or four species of our native bees of the family Apidae were noted on the flowers. Three small species of moths of the family Geometridæ were captured, one species being quite new to me. Several fine specimens of Spider-orchids were noticed growing in the shade of eucalypt trees. Two species of Acacia, *Acacia armata* and *A. verticillata*, were in flower, also the Coast Tea-tree; *Leptospermum laevigatum*. The afternoon was fairly warm, and, as members of the party were feeling thirsty, we decided to pay a visit to the Frankston Reservoir, which is situated about a mile from the three-chain road going towards Frankston and about a quarter of a mile from the Hastings road. We boiled the billy and had afternoon tea in the shade of a eucalypt tree. While we were having an enjoyable rest a number of mosquitos paid us a visit and forced us to move on again. We then followed the pipe track, which leads on to the Frankston Hills estate. The hills were covered with white flowers, mostly *Leptospermum myrsinoides* and the Wedding-hush, *Ricinocarpus pinifolius*. Several specimens of a

small robber fly of the family Asilidae were noted, also four species of Lycænid butterflies—the Common Blue, *Zizina labradus*, Double-spotted Blue, *Nacaduba biocellata*, Blotched Blue, *Candalides acasta*, and the Dusky Blue, *C. hyacinthina*. The Blue-spotted Painted Lady was flying about the flowers in large numbers. While beating the bushes of *Aotus villosa* I secured three larvæ of a small Lycænid, the Fringed Blue, *Neolucia agricola*. Last year I secured three or four larvæ feeding on the same food plant at Cheltenham, and on the Bendigo excursions a number of the larvæ were found feeding in the flowers of the Gorse Bitter-Pea, *Daviesia ulicina*, a different species of food plant. After having spent a most pleasant and enjoyable day we reached Frankston in time to catch the 6 p.m. train to town.

The following twenty-four species of birds were seen during the day:—Harmonious Shrike-Thrush, Spinebill Honey-eater, White-shafted Fantail, Bronze-wing Pigeon, White-fronted Heron, Rosella Parrot, Kookaburra, Pallid Cuckoo, Bronze Cuckoo, Wood-Swallow, Yellow-breasted Shrike-Robin, Blue Wren, Yellow-tailed Tit-Warbler, Wattle-bird, Red-browed Finch, Spotted-sided Finch, Butcher-bird, Spur-winged Plover, Noisy Miner, and five species of introduced birds—Starling, Sparrow, English Blackbird, Green Linnet, and Goldfinch.—
L. THORN.

CENSUS OF VICTORIAN PLANTS.

The following additions and alterations have been made to the "Census of Victorian Plants" by the National Herbarium authorities:—

ADDITIONS.

Page 26.—*Bassia tricornis*, F. v. M. Three-horned Salt-bush N.W.
 64.—*Mimuria denticulata*, Benth. Toothed Mimuria N.W.
 65.—**Centipeda thespidioides*, F. v. M. Desert Sneezeweed N.W.
 (All collected at Midura, September, 1923. J. E. B. Williamson)

AUTHENTIC LOCALITIES FOR DOUBTFUL PLANTS.

85.—*Elachanthus pusillus*, B. v. M. *Elachanthus* "Delete" Murray.
 86.—*Chthonocephalus pseudovox*, Steetz Groundheads "Delete" Murray.
 (Both collected ab Merrina, south-west of Mildura, September, 1923, H. B. Williamson.)

NEW LOCALITIES

Page 13.— <i>Chlorantha enodis</i> , Lelloue...	Black Biblio-quash	S. Lorn (Rev. A. C. V. Gates).
," 21.— <i>Diuris patachilla</i> , Rogers ..	Brond-lip Diuris	N.E. (Beech- worth, J. W. Audubon, Sept. 1923).
No. 1.—December, 1923.		

* Removed from page vi.

THE FOSSILIFEROUS BEDS OF VIOLET CREEK,
NEAR HAMILTON.

BY FREDK. CHAPMAN, A.L.S., Palaeontologist, National Museum, Melbourne.

(Read before the Field Naturalists' Club of Victoria, 10th Sept., 1923.)

(1) *Early Reference to Locality.*—In 1870 Prof. P. M. Duncan published his classic paper on "The Fossil Corals of the Australian Tertiary Deposits."* This was chiefly based on a collection of fossils made by the Victorian Geological Survey some years earlier, and sent to Duncan by the then Director, A. R. C. Selwyn. This collection was supplemented by examples furnished by Tenison-Woods and a few which Duncan found in the Museum of the Geological Society of London.

Amongst these corals was a species which Duncan named *Caryophyllum viola*,† since transferred to the genus *Deltocyathus*. The trivial name was derived from its discovery at Violet Creek, a stream which runs parallel with the Muddy Creek, as the latter, with its tributary the Grange Burn, flows into the Wannon.

Scarcity of Outcrops.—Writing in regard to the strata of Western Victoria in 1889, the late Mr. John Dennant says §:—"In its course towards the Wannon, the Grange Burn is joined by two tributaries—viz., Muddy Creek § and Violet Creek. Although all three are insignificant streams, and confined now in narrow channels, yet the valleys through which they flow are not only wide, but depressed considerably below the level of the surrounding country. I have not observed any fossil outcrops in the Violet Creek, which is the more remarkable as they occur in so many places in both the Grange Burn and Muddy Creek."

(2) *Condition of Violet Creek Noted by the Writer.*—During a visit paid to the Hamilton district in December, 1905, accompanied by my son, W. D. Chapman, and Mr. L. R. Kurtze, of Hochkirch, I examined the area of the Violet Creek as far as possible after a strenuous walk on an especially warm day. We were so fortunate as to find several outcrops both of the Janjukian polyzoal rock and the Kalimna beds, although the country round presents little opportunity for geological work on account of the thick subsoil. It is, therefore, easily conceivable that these Tertiary beds were so masked by hillwash that Mr. Dennant, on a cursory visit, overlooked them. We must here say a good word for the rabbits, whose work, as on

* Quart. Journ. Geol. Soc., vol. xxvi., part 3, pp. 294-318, pls. xix.-xxi.

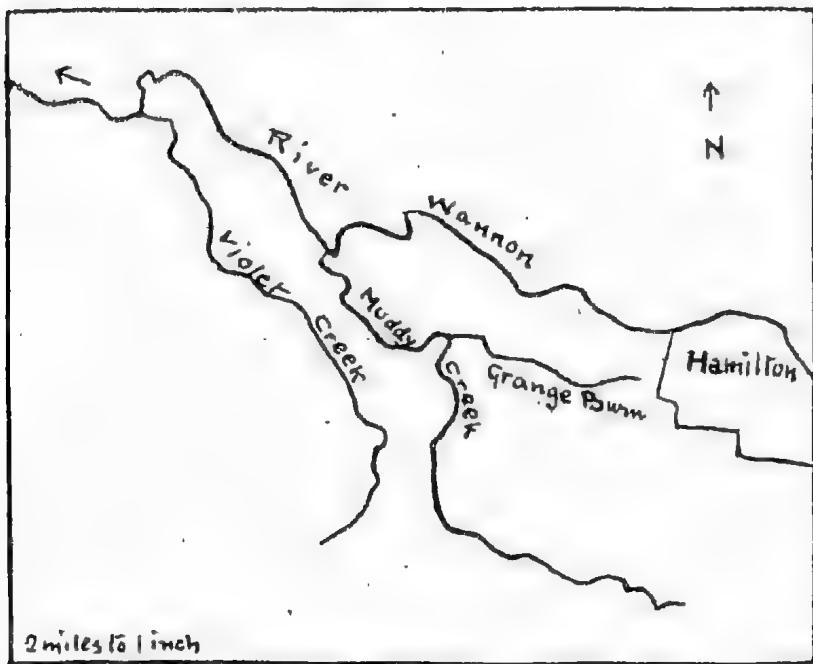
† *Op. supra cit.*, p. 295, pl. xix., fig. 1.

§ Trans. Roy. Soc. S. Australia, vol. xi., 1859, p. 31.

§ Slightly inaccurate; see map.

former occasions, was appreciated, by their turning out samples of the rocks from within their burrows. We thus first noticed the polyzoal limestone freshly excavated on the talus banks.

(3) *The Polyzoal Rock of Violet Creek.*—The rock is friable and of a rich yellow-brown colour. It resembles the finer-grained limestone of some parts of the Grange Burn section. Being largely composed of the small twiggy forms of polyzoa, with occasional foliaceous masses (*Macropora* and *Adeona*), it is almost purely polyzoal rather than foraminiferal. Its condition of sedimentation would probably be that of a com-



RIVER SYSTEM WEST OF HAMILTON.

paratively deep-water phase (about 50-100 fathoms) rather than a moderately shallow one (5-50 fathoms), as in the *Amphistegina** and *Lepidocyclina* limestone of Grange Burn.

Some of the strata in the Mallee bores † resembled this rock in their comparative freedom from foraminiferal remains, but

* The *Amphistegina lessonii* of Grange Burn is the flattened and lenticular form of shallow water deposits, as distinguished from the dome-shaped variety.

† Chapman, F., "Cainozoic Geology of the Mallee and Other Victorian Bores," Records Geol. Surv. Vict., vol. iii., part 4, 1916.

they were not iron-stained, as in the case of the Violet Creek limestone. The absence of *Lepidocyclina* is striking, since this locality is only a few miles from Grange Burn, where it is abundant; but this may be accounted for by depth conditions, as noticed above.

A specimen of the rock collected above Mr. Francis's station contained the following fossils:—

FORAMINIFERA.

Fam. *Miliolidæ*.—

- Miliolina bicornis*, W. and J., sp.
- „ *cuvieriana*, d'Orb., sp.
- „ *seminulum*, L., sp.
- „ *vulgaris*, d'Orb., sp.

Fam. *Textulariidæ*.—

- Spiroplecta gramen*, d'Orb., sp.
- „ *sagittula*, Defr., sp.
- Gaudryina rugosa*, d'Orb.
- Cassidulina subglobosa*, Brady.

Fam. *Lagenidæ*.—

- Nodosaria (Dentalina) obliqua*, L., sp.
- Polymorphina angusta*, Egger.
- „ *elegantissima*, P. and J.
- „ *lactea*, W. and J., sp.

Fam. *Rotaliidæ*.—

- Truncatulina resulgens*, Montfort, sp.
- Anomalina ammonoides*, Reuss, sp.
- „ *grosserugosa*, Gümbel, sp.
- Carpentaria proteiformis*, Goës.
- Pulvinulina calabra*, Costa, sp.*
- „ *elcgans*, d'Orb., sp.
- Rotalia calcar*, d'Orb.

ECHINODERMATA.

Echinoid spines, indet.

POLYZOA.

CHEILOSTOMATA.

Fam. *Cellariidæ*.—

- Cellaria contigua*, MacGill.
- „ *rigida*, var. *perampla*, MacGill.

Fam. *Microaporellidæ*.—

- Adeona clavata*, Stoliczka, sp.

Fam. *Schizoporellidæ*.—

- Schizoporella nilens*, MacGill.

Fam. *Smitiidæ*.—

- Porina gracilis*, M. Edw., sp.

* Previously recorded from the Mallee bore, *op. supra cit.*, p. 385, pl. lxiii, figs. 8 *a*, *b*.

CYCLOSTOMATA.

Fam. *Crisiidae*.—*Crisia macrostoma*, MacGill.*" scalaris*, MacGill.Fam. *Idmonocidae*.—*Filispsara orakeiensis*, Stol.*Hornera sulcata*, MacGill.Fam. *Tubuliporidae*.—*Entalophora longipora*, MacGill.Fam. *Lichenoporidæ*.—*Lichenopora radiata*, Adouin, sp.

(4) *The Fossiliferous Ironstone of Violet Creek*.—Higher up the valley of the Violet Creek, and in the bed of the stream, we found an ironstone with numerous casts and moulds of fossils. Very few of these could be determined, but the following typical Kalimnan fossils were recognized:—

Clausinella subrobusta, Tate, sp.*Eglisia triplicata*, Tate, sp.

This ironstone probably links itself with that of Stawell, in which, however, Janjukian fossils also occur, and of Redruth,* where a bird's feather and some *Banksia* and *Eucalyptus* leaves of modern specific forms were found and described some years ago by the writer.

(5) *Summary*.—From earlier evidence (Geol. Survey of Victoria, *supra cit.*) and from the present notes, it is assumed that the entire succession of the Tertiaries is present in Violet Creek—that is to say, from Balcombian to Kalimnan.

The occurrence of *Deltocyathus viola*, although found in the Otway and Barwon Tertiaries, here indicates a Balcombian horizon, since it is also a typical coral at Muddy Creek (Balcombian), and has not there occurred in the Janjukian of the Violet Creek phase.

The Janjukian horizon, with its polyzoal and moderately deep sea phase, herein described from this locality for the first time, is shown to belong to that age by its characteristic foraminifera, such as the abundant *Rotalia calcar*, and the rare *Pulvinulina calabra*, before found only in the Janjukian of the Mallee bores.†

The Kalimnan horizon is fixed by two typical fossils of a restricted Kalimnan facies. The tenacious ironstone beds of this stage show the Flemington and Keilor Janjukian ironstone phase to be extended later into the Kalimnan in this direction. The nature of the rock indicates a bog iron ore induced by swampy conditions impinging on a marine area, and this geographical aspect points to a larger rainfall than at present.

* Chapman, F., Proc. Roy. Soc. Vict., vol. xxlii, (n.s.), part 1, 1910, pp. 21-26, pls. iv.-v.

† Proc. Roy. Soc. Vict., vol. xxvi. (n.s.), part 1, 1913, p. 172, pl. xvi., figs. 8 a, b.

NOTES ON THE VICTORIAN CHLAMYDOPSINI (COLEOPTERA). WITH DESCRIPTIONS OF NEW SPECIES.

BY CHARLES OKE.

(Read before the Field Naturalists' Club of Victoria, 12th Feb., 1923.)

THE minute beetles known as the Chlamydopsini have received various treatment at the hands of systematists. Westwood,* in 1869, proposed the genus *Chlamydopsis* for two species taken in Western Australia by the late F. H. Du Boulay, and King,† the same year, proposed the name *Bizenia* for a congeneric species from New South Wales; but, as Westwood's paper was issued first, his name has priority. Lewis,‡ in 1903, formed the genus *Orectoscelis* for a species taken in Queensland by F. P. Dodd, and transferred one of Westwood's species to it. Lea,§ in 1914, proposed *Ectatommiphila* and *Pheidoliphila* as two new genera at the expense of *Chlamydopsis*, putting two species in the former and five in the latter. Mjöberg || proposed the genus *Eucurtia* for a specimen of *C. comalu*, Blackb., a synonymy noted by Lea. Bickhardt, in Wytsman's "Genera Insectorum," treated these genera as forming the tribe Chlamydopsini, and, though he mentions Lea's genus *Pheidoliphila* (in litt.), he makes no reference to *Ectatommiphila*, but gives *Eucurtia* as a valid genus. Several of the species have been given a wrong habitat in Bickhardt's list.

Of the thirty-four described species belonging to this group, fifteen have been recorded for Victoria, and I now add six new species.

The following are the species known to occur in Victoria, the localities where they have been taken, and the ants they have been found associated with. All types, and a specimen of each species marked with an asterisk, have been deposited in the National Museum, Melbourne.

FAMILY HISTERIDÆ.

SUB-FAMILY HÆTERINÆ.

TRIBE CHLAMYDOPSINI.

* *Chlamydopsis pygidialis*, Blackb.

Described from a specimen taken while beating dead leaves at Fernshaw, Victoria. It has also been taken at Beaconsfield (F. E. Wilson), Ferntree Gully (Oke, W. Du Boulay, J. E.

* Westwood, Trans. Ent. Soc., London, 1869, p. 317.

† King, Trans. Ent. Soc., N.S.W., 1869.

‡ Lewis, Ann. Mag. Nat. Hist., vol. xii. (7), p. 426 (1903).

§ Lea, Pro. Roy. Soc., Vict., vol. xxvi. (1914).

|| Mjöberg, Ent. Tidskrift, p. 121 (1912).

Dixon, F. E. Wilson); Belgrave, Healesville, Warburton, Yarra Junction, Emerald, Pakenham (Oke), always associating with a small black species of Chalcoponera. Length, 3.12 mm.

* Var. *minor* (n. var.)

A variety of this species occurs which is much smaller and more parallel than the usual form, and the edentations on the humeral angles are less distinct. Length, 2.4 mm. Hab., Victoria: Belgrave, Ferntree Gully (Oke), Beaconsfield (F. E. Wilson), in nests of Chalcoponera, sp.

* *Chlamydopsis formicicola*, King.

Described by Rev. King as *Bizenia formicicola* from specimens obtained at Liverpool, N.S.W., and has been taken in Victoria at Sea Lake (J. C. Goudie) and Bendigo (Oke).

* *Chlamydopsis ciliplauralis*, Lea.

Described from specimens taken at Hornsby, N.S.W., in which State it appears to be a common species. The only Victorian specimens I have seen were taken near Whittlesea (Oke), in nest of *Iridomyrmex gracilis*, Lowne.

* *Chlamydopsis longipes*, Lea.

Described from specimens taken at Bannockburn, Victoria, by Mr. H. W. Davey, and has been recorded from South Australia. New localities:—Molton (Oke), W. Du Boulay, Bacchus Marsh (Oke), in nests of *Chalcoponera metallica*, Sm.

* *Chlamydopsis excavata*, Lea.

Described as from near Hobart, Tasmania. It has been taken in National Park, N.S.W. (W. Du Boulay, F. E. Wilson), and is now recorded from Victoria—Beaconsfield (F. E. Wilson), Belgrave, and Ferntree Gully (Oke), in nests of Chalcoponera, sp.?

Chlamydopsis tuberculata, Lea.

Described from three specimens obtained at Ararat by Mr. H. W. Davey. It has since been taken at Lorne (F. E. Wilson), Grampians (E. Fischer), Macedon (Oke), in nests of *Iridomyrmex rufoniger*, Lowne. Both Mr. Wilson and Mr. Fischer have placed a specimen of this species in the National Museum collection.

Chlamydopsis octalotima, Lea.

Described from Sydney, N.S.W., now recorded from Victoria for the first time; Bacchus Marsh (Oke), in a nest of *Chalcoponera metallica*, Sm.; (?) Lakes' Entrance (F. E. Wilson).

* Var. *rufomaculatus*, n. var.

A variety of this species occurs, with the greater portion of the elytra a bright reddish-castaneous, thorax and appendages much darker, tip of elytra and body almost black. The lateral margins from apical quarter parallel, not "gently incurved to

middle." Length, 2.16 mm. (type); another specimen, 1.72 mm. Hab., Victoria: Melton, Bacchus Marsh (Oke), in nests of *Chalcoponera metallica*, Sm. This may be the variety mentioned by Lea (Rec. S.A. Mus., vol. i.), but I think it is so distinctive in colouring that it should be named. The colour is, apparently, not due to immaturity, as I have kept a specimen alive for three weeks, during which time the colour did not darken, though it did after the specimens were mounted some months.

* *Chlamydopsis striatipennis*, Lea.

Described from a single specimen obtained at Lorne by Mr. F. E. Wilson. Other records are Whittlesea (C. Oke, Nov., 1908), Warburton, Ferntree Gully (C. Oke, F. E. Wilson), Belgrave, Emerald (C. Oke), in nests of *Chalcoponera*, sp.?, and a small black *Iridomyrmex*.

* *Chlamydopsis carinicollis*, Lea.

Described from a single specimen obtained at Beaconsfield by Mr. F. E. Wilson in nest of *Aphaenogaster longiceps*. I have taken several specimens in nests of *Chalcoponera*, sp.?, at Ferntree Gully and Upwey. This species varies greatly in size, ranging from 1.72 to 2.32 mm.

Chlamydopsis scipennis, n. sp.

Dark chestnut brown, in parts lighter, almost reddish; fascicles and setæ pale golden yellow. Head immersed in thorax when at rest, somewhat rounded, widest in front, gently narrowing to base, finely shagreened, with a few moderate punctures; face with large shallow reticulate punctures; eyes distinctly faceted. Antennæ moderately long; scape curved, its apical half thickened, in front with punctures as on face, behind finely shagreened; funicle short, seven-jointed, basal joint large, subcylindrical, second joint very fine at base, then increasing in thickness to club, which is long, subcylindrical, gently pointed. Prothorax distinctly transverse: front margin slightly elevated, and straight across median half, thence more elevated, at an oblique angle, to sides, then in a straight line to base; the lateral elevation gradually diminishes in height till it ceases at base; disc with dense reticulate punctures, and finely granulated. Elytra slightly longer than wide, a little wider than prothorax, with well-raised epaulettes, crowned by a large golden-yellow fascicle; basal depression rather small, but deep, with an impression running under the epaulettes and opening on the sides, on the epipleura (from this opening coarse striae radiate in all directions): there is also an opening in front and behind epaulettes; the striae in depression transverse behind scutellar region, then curving outward and down elytra; a large depression near hind angles. Pygidium with a

transverse row of sharp teeth. Under surface in parts with dense reticulate punctures, and short setæ; metasternum with a narrow median carina. Legs long; tibiae compressed, thin, and angular, narrow at base, fairly wide at apex, widest at end of tarsal groove, where the flange is cut off at an acute angle. Length, 2.16 mm.

Hab., Victoria: Ferntree Gully, Belgrave, Sassafras, Evelyn (C. Oke), in nests of *Notoncus foreli*, Andre, var. *dentatus*, Forel.*

This remarkable little beetle is literally covered with setiferous granules, being most apparent around margin of pronotum and elytra, on pygidium and propygidium; but if held on a plane with the eye, and looked at from in front or sides, they will be seen in all directions. Some specimens have the pronotum roughened, and some small nodules on disc, but this is generally absent.

At a casual glance this species somewhat resembles *sericeus*, Lea, but is very distinct by, *inter alia*, margins of thorax, clothing, and striae of elytra. In Mr. Lea's tabulation of the genus it would be associated with *oculatum*, Lea, because of its transverse scutellar striae; but *oculatum* has a very small fascicle, and not the clothing of the present species; the tibiae are also differently shaped.

Chlamydopsis leai, sp. nov.

Very dark brown, in parts black, with distinct bronzy reflections, legs reddish-brown. Head immersed in thorax when at rest, rounded, with a few fine punctures; face slightly concave, with large, shallow, reticulate punctures; eyes very finely granulated. Antennæ long; scape long, basal half very narrow, then suddenly widened—in front with punctures, as on face, behind finely shagreened; funicle distinctly seven-jointed, first joint rather long and thick, second thin, then gradually increasing in thickness to club, which is thick, rather short, and sharply pointed. Prothorax strongly transverse, disc convex, with a short obtuse tubercle and dense reticulate punctures, and with short yellow setæ; frontal margin well elevated and slightly recurved; this central piece is not quite width of head (here there is a distinct break in margin); then a piece starts in front of but near ends of this central piece, and runs at an oblique angle to the sides, where it is unusually high, and forms a sharp point, then rapidly diminishes away; hind angles slightly rounded off; a narrow marginal line at base. Elytra subquadrate, narrowed at base, then suddenly widened; hind angles widely rounded off; epaulettes highly elevated, with sculpture as on pronotum; large sub-basal depression, its

* I am indebted to Mr. J. Clark, of Western Australia, for the identification of this ant.

sides vaulted, where there are some stiff yellowish hairs; depression highly polished, but with minute, hardly perceptible, sclerous punctures; a deep transverse impression near base, not opening on sides, but this is indicated by a small, shallow foveæ, towards which the striae are directed; outside the depression the elytra are striated; a large foveæ at hind angles; near apices a few coarse setæ. Prosternum in front and sides with reticulate punctures, almost becoming transverse striae in centre, between coxae and mesosternum coarsely punctured. Metasternum and most of abdomen finely and sparsely punctured. Pygidium and propygidium sub-opaque, with reticulate punctures and conspicuous setæ. Legs long; tibiae slightly angular, outside edge curved, tarsal groove on inside flat surface. Length, 3.5 mm.

Hab., Victoria: Ferntree Gully, Belgrave (C. Oke), July and December, in nests of *Iridomyrmex*,* sp.?

This strongly-striated species somewhat resembles *striatipennis*, Lea, but may be easily separated from that species by, *inter alia*, the shape of the thorax, base of elytra, the clothing, and the striae are coarser. In Mr. Lea's table it would be associated with *striatella*, Westw., from which it differs, *inter alia*, in the shape of the epaulettes and legs, and the punctuation of the under surface.

I have much pleasure in naming this species after Mr. A. M. Lea, who has done so much good work amongst the myrmecophilous coleoptera of Australia. The type is probably a female, the antennæ being as figured by Mr. Lea for *latipes*. I have a specimen from Sassafras, unfortunately damaged, which is probably the male. It is slightly smaller, and the antennal club is longer, thinner, and slightly curved. Length, 2.56 mm.

Chlamydopsis puncticollis, n. sp.

Black, or almost so; epaulettes, antennæ, and legs reddish-castaneous. Head immersed in thorax when at rest; face slightly concave, with rather large, clearly defined punctures. Antennæ fairly long; scape narrow at base, inflated near apex, with punctures, as on face; funicle short, first joint thick, second thin, then increasing in width to apex; club long, curved, subcylindrical. Prothorax strongly transverse, medio-basal two-thirds convex; front margin faintly bilobed, lightly elevated across width of head, then more elevated, with a strong inward curve to lateral margin, which is slightly sinuate, and not elevated beyond apical third, with coarse, dense punctures. Elytra subquadrate, with a rather deep transverse depression near base, reaching the sides, but towards each side concealed

* An undetermined species, which Mr. J. Clark thinks is probably undescribed.

by a raised humeral process, meeting a subhumeral process, bearing on their apex a golden-red fascicle attached to a membrane; in depression lightly polished; beyond depression with well-defined striolæ, reaching, but becoming shorter near, apex. Prosternum and mesosternum, sides of abdomen, pygidium and propygidium with large reticulate punctures. Metasternum with an impressed longitudinal line. First joint of abdomen with a row of small punctures around basal margin. Legs fairly long; tibiae strongly inflated, inflated parts rather suddenly cut off at termination of tarsal groove. Length, 2.28 mm.

Hab., Victoria: Ferntree Gully (C. Oke), from nests of *Chalcoponera*.

This species is perhaps nearer to *striatella*, Wesl., than any other described species, but is easily separated from that species by (*inter alia*) pronotum glabrous and different subhumeral structure. From *atra*, Lea, it differs in the coarser and deeper puncturation of pronotum, smaller humeral processes, no ridge on scutellar region, and striae not becoming punctures at apex of elytra.

The punctures on the pronotum of the present species are coarse and deep, and somewhat elongated in a line with the body.

Chlamydopsis strigicollis, n. sp.

Black; antennæ and legs reddish-castaneous. Head immersed in thorax when at rest; face with dense reticulate punctures. Antennæ rather long; scape thin at base, widened towards apex, with punctures as on face; funicle short, apparently six-jointed; club long, curved, subcylindrical. Prothorax transverse, convex, with short confluent striole and rather long pale setæ; front margin lightly elevated, straight, then more elevated and slightly curved to side, thence elevated to base. Elytra subquadrate, with a transverse sub-basal depression continued to sides, but hidden near the sides by raised humeral and subhumeral processes, nearly meeting, and crowned with a golden fascicle; near scutellar region is a raised ridge directed caudad; highly polished within the depression, beyond with fine but sharply-defined striae to apex and sides; with very short pale setæ, except on humeral angles and scutellar region, where it is long. Epipleuræ with striae converging on opening of depression. Prosternum and mesosternum, sides of abdomen, pygidium and propygidium with sparse, large, shallow punctures. Legs moderately long. Tibiae strongly inflated; inflated parts suddenly ending on front pair, leaving a sharp angulation, middle pair similar, but not so sharply angular, hind pair much less angular. Length, 2 mm.

Hab., Victoria: Hurst's Bridge, Belgrave, Ferntree Gully (C.

Oke), Beaconsfield (F. E. Wilson), Mooroolbark (E. Fischer), in nests of *Chalycoponera*, sp.

The sculpture of the pronotum is peculiar and distinctive. In the centre front there are a few punctures (almost round); then the striæ are curved and run around the convex portion, on top of which they are transverse, and on the sides they run straight up and down. The clothing of the pronotum is more pronounced than on any other species known to me.

This species somewhat resembles *atra*, Lea, in the shape of the elytral depression and the legs, but differs in the clothing, sculpture of pronotum, and the striae being continuous to apex of elytra. *Siriatella*, Westw., is described as having "minute setigerous punctures" on pronotum, a description that would hardly fit the present species, and the epaulettes and sculpture of under surface are not as in Westwood's figure.

Chlamydopsis sculptus, n. sp.

Chestnut-brown, in parts infuscated. Head immersed in thorax when at rest; face slightly concave, with fine, close, distinct punctures. Antennæ fairly long; scape narrowed at base, rather suddenly widened from about middle, with punctures as on face; funicle stout, apparently six-jointed, thickened to apex; club rather short and thick. Prothorax strongly transverse, with fine, close punctures: disc gently convex, front margin well elevated in a sinuous line, a little wider than head, then slightly more elevated, at an acute angle to sides; lateral margins almost parallel, and feebly elevated. Elytra slightly wider than long, a little wider than thorax, with a large sub-basal depression; opening out on the upper edge of the epipleuræ, the striae of which are directed towards it; ends of depression with a golden fascicle; a feeble, transverse, elevated ridge on each side of scutellum closely punctured; each shoulder raised, with a few large punctures, and an impressed line running from angle of thorax to lateral extension of depression, and separating it from rest of elytra, between this line and depression, a raised process ending in a sharp tooth overhanging lateral extension of depression, and almost meeting a similar process on the other side; on their inner edges a dark, pubescent membrane; elytra beyond scutellar region with some punctures, then with rather fine confluent striæ not quite reaching apex, and numerous golden setæ. Under surface finely shagreened, and with sparse, fine punctures, an impressed line on metasternum. Legs long; tibiae strongly inflated, the inflated parts acutely angular. Length, 2 to 2.88 mm.

Hab., Victoria: Sea Lake (J. C. Goudie), Bendigo (J. E. Dixon and C. Oke), Macedon (C. Oke), Daylesford (F. E. Wilson).

Ballarat (W. Du Boulay). South Australia: Mount Lofty (F. E. Wilson), in nests of *Iridomyrmex*.

This species has passed as *epipleuralis*, Lea, but the puncturation of the prothorax, &c., is certainly distinct, and the front angles of that segment, when viewed directly from above, are more acutely cut off.

Numerous specimens were obtained at Bendigo, and were all of a very pale colour when alive, though they have darkened since mounted, and were of a uniform size—2 mm. Specimens from other parts were all darker, and varied considerably in size.

Orectoscelis bifoveacollis, n. sp.

Light castaneous, abdomen darker, legs and antennæ almost flavous, subnitid; clothed with minute pale setæ, nowhere thick, but closest around scutellar region. Head immersed in thorax when at rest; face with large shallow punctures. Antennæ rather short and thick; scape narrow at base, somewhat suddenly inflated near middle, with punctures as on face; funicle apparently six-jointed, first joint long and thick, second short and thin, then gradually thickening to apex; club short and thick. Prothorax slightly wider (at base) than length down centre, much narrowed to apex; convex, with rather large punctures, becoming strigose at sides; front margin bisinuate across head, then strongly elevated, at an oblique angle, to sides, where it is suddenly cut off; outside this the lateral margin is raised and reflexed to about basal third, where there is a fairly large, deep foveæ. Elytra subquadrate, with a transverse sub-basal depression, opening above, and on, the epipleurae; the striæ of the latter in convex curves, the opening filled with a bright golden fascicle; in excavation smooth, beyond with feeble, indistinct aurolets, becoming more defined at sides. Pygidium with rather large, feeble aurolets. Under surface shagreened, with a few faint punctures on anterior half of metasternum, which has a faintly-impressed line down its posterior half. Legs moderately long; all the tibiae distinctly flanged, the flanges increasing in width from apex to near base, and then more or less obliquely cut off; the flanges deeply grooved for the reception of the tarsi. Length, 1.85 mm.

Hab., Victoria: Natya (C. Oke), near nests of *Euponera lutea* and a small black *Iridomyrmex*, under log. Type unique.

The foveæ on the pronotum is a distinctive character of this species, no species being described as having them. They are round, and impressed obliquely into the pronotum, with the opening directed forward. When fresh there appeared to be traces of a small pubescent membrane within the foveæ, but this is not discernible now.

I refer this species with some slight doubt to *Orectoscelis*, but, as the prosternum is not distinctly keeled as in other species, and the mesosternum not bisinuate anteriorly—merely a narrow segment, as figured by Westwood for his *duboulayi*—it seems better placed here than in *Chlamydopsis*. The base of the pronotum in *bifoveacollis* is as in *O. humeralis*, Lewis, though the sides of depression and legs are similar to *duboulayi*, the legs being slightly more angular.

* *Ectatommiphila opaca*, Lea.

Described from New South Wales, and has been taken in Queensland; it is now recorded from Victoria—Geelong district (H. W. Davey); You Yangs (C. Oke). Victorian specimens are slightly larger, and with the pubescent membranes more distinct than in specimens from New South Wales. In nests of *Chalcosoma metallica*, Sm.

Ectatommiphila glabra, Lea.

Two specimens of this species are recorded—one, the type, from the Blue Mountains, in New South Wales; the other from Mount Tambourine, in Queensland. I have a specimen from Beconsfield which I took off a stump, where it had evidently just alighted, as the wings were protruding around elytra, which is almost certainly this species. Not being too confident that my beetle really was this species, I submitted it to Mr. A. M. Lea, who very kindly sent the following notes.—“*Ectatommiphila*.—Seems var., or possibly other sex, of *glabra*, of which I have but the type; differs in being about one-fourth larger, and with a golden, transverse, split membrane on each side of elytra in the sub-basal depression. . . . On the type of *glabra* the split membranes are much less conspicuous and not at all golden; the punctures, general shape, hind parts, and legs are absolutely the same.” A second specimen of this species was taken from a pool of water at Lakes’ Entrance by Dr. F. Burnet. Length, 5.1 mm.

Pheidoliphila carbo, Lea.

Described from a single specimen taken at Sea Lake by Mr. J. C. Gondie. Still unique. In nest of *Pheidole*, sp.?

Pheidoliphila granulata, Lea

Described from a single specimen taken in Geelong district by Mr. H. W. Davey. Still unique. In nest of *Pheidole*, sp.?

* *Pheidoliphila pseudocephala*, Lea;

Described from a single specimen taken at Latrobe, Tasmania, by Mr. A. M. Lea, it is now recorded from the mainland for the first time, having been taken in Anglesea district (C. Oke) and Terang (F. Burnet).

I am indebted to Mr. A. M. Lea for confirming my identification of this species.

* *Pheidoliphila minuta*, Lea.

Described from a single specimen taken at Ferntree Gully by the late Mr. F. Spry. It occurs freely in nests of *Pheidole*, sp. ?, at Ferntree Gully, Belgrave, Emerald, Evelyn, Warburton, and Healesville.

BIONOMICS.

The Chlamydopsini, one of the most interesting groups of beetles in Australia, are all inquilines of ants, though one, *C. comata*, has been found in a termites' nest. Little or nothing is known regarding their relations with their hosts. Judged by the structure of the body and legs, and the complete way in which they "shut up"—that is, the retraction of the head within the thorax and the legs within grooves on the sides of the body—they appear to be of the offensive type of inquiline. On the other hand, the possession by a number of the species of well-developed fascicles of hairs within or on sides of clytral depression, and which are, no doubt, connected with secretory glands, makes one think that perhaps they give off something that the ants are fond of, and so make them welcome guests.

Neither the larvæ or pupæ have been found, so nothing about their breeding is known, and I am not aware of any notes regarding their habits having been published.

On turning over the stone or log covering the nest, the ants will be seen running in all directions, and, with the exception of the species of *Iridomyrmex*, they gradually quieten down, and practically all retire down the galleries. *Iridomyrmex gracilis* and *I. rufoniger*, however, swarm out and overrun everything around the nests. The ants, as a rule, take no notice of the beetle, whether it is still, moving slowly, or running across the nest—not even if it is among their larvæ and pupæ. The ants, in running around, often collide with the beetle; generally they run around or pass over it without taking any notice. Occasionally an ant will pause and give the beetle a rather close scrutiny, and then move on. On two occasions, at Bendigo, I have seen the little *Iridomyrmex* pick up *C. sculptus* and carry them off, and hide them behind little stones in the galleries; and three times I have seen the *Notoncus* pick up *C. selipennis* and run off into the galleries with them. The ant in each case caught hold of the beetles by inserting their mandibles into the lateral opening of the elytral depression. This may have been by accident, but was probably not. After dropping the beetles, all five ants spent some time cleaning (?) their mouths with front legs and antennæ. Unfortunately, it was impossible to say, from their expressions, whether they

were pleased or disgusted. I have several times seen the Pheidole that *P. minuta* lives with pick them up and run away with them, but have not been able to definitely see how they were picked up, but the beetle is held half sideways, and I think it is held by the cleft shoulder.

The beetles behave variously; thus, *C. pygidialis* may be found either sitting or running about in the galleries, around edges of the nest, among the *debris*, or, where the nest is vaulted, on sides or top of vault, or even on the covering stone, and this applies, apparently, to all the species. Generally they are found "shut up" in the nest, but in a few minutes they will start and make a run for one of the entrances to the underground nest, though once I watched *pygidialis* for an hour, and *longipes* for over half an hour, without any apparent movement. When alarmed they all "shut up" tightly and retract their legs into the grooves on their bodies; but if *longipes* be tickled lightly, with finger or bit of grass, they put their long hind legs up in the air at an angle of about forty-five degrees. As they are the only species that do this, and also the only one (so far described) that have an apical spur on the hind tibiae, I have thought that perhaps they secure a hold on the covering stone to resist the ants from dragging them along. If their structure is really to withstand attacks from the ants, it seems strange that the largest and strongest species of the typical genus, *Chlamydopsis*, known to me cohabits with the frailest ant that acts as host.

The only times I have known a beetle to eat anything was when I opened a nest of *Iridomyrmex gracilis* at Upwey and found *striatipennis* with a larva in its mandibles. I kept this specimen alive in a box with several well-fed larvæ, and one of the latter disappeared on the second day.

Apparently they cannot smell when they are tightly shut up, for if you blow smoke on them then they make no sign whatever; but if they are resting, as they very often do, with just the tip of the antennæ showing, and you blow smoke on them, they immediately become agitated. This may demonstrate that the olfactory nerves are situated in the antennæ, or it may be that it allows the smell to percolate down to some other part of the body; but I consider the former the more likely.

The only species I have known to fly is *strigicollis*. I was trying the effect of smoke on one of these when, to my surprise, it suddenly and very quickly spread its wings and flew a few inches in the air, when I knocked it down again. The only specimen of *E. glabra* I have taken was from a stump, where it had apparently just landed, as it had its wings protruding from beneath the elytra.

BOOK NOTICE.

FOREST INSECTS OF AUSTRALIA. By Walter W. Froggatt, F.L.S., Government Entomologist of New South Wales. 170 pp. (8 x 4½ inches). With two coloured plates, 44 full plates, and 33 text blocks. Sydney: A. J. Kent, Government Printer, N.S.W. 7s. 6d.

In this useful volume the author has brought together all the available information regarding insects destructive to the forest trees of Australia, much from his own work, "Australian Insects," and from articles contributed by him from time to time to the *Agricultural Gazette* of New South Wales. The subject is treated in sections, dealing with Plant Galls (in which the value of birds as insect destroyers is well emphasized), White Ants (Termites), and Wood-boring Beetles. Then the enemies of various forest trees and allied species are each given a chapter, such as "Insects of the Sugar Gum," "Insects of the Wattles," "Insects of the Red Cedar," or "Insects of the Banksias." By this means it is made easy to trace the insect doing any particular damage. One of the coloured plates illustrates a group of wood-boring moths—that is, the larvae are wood-borers—belonging to the genus *Charaga*, known generally by their green-coloured wings and rather long bodies. The other illustrates the lerp scales found on eucalypts; these, by the way, make beautiful objects for the microscope. A large number of plates are devoted to life-histories, while the text blocks in many cases represent the insects greatly enlarged, thus rendering identification easier. The work is one which should be in the hands of every entomologist, who will find in it much to interest him, and in some cases gaps in life-histories which will give him useful occupation while pursuing his favourite study.

THE SILVERY WATTLE-MOTHS.—Perhaps the most beautiful of the smaller moths of Australia are those belonging to the genus *Thalaina*, of the family Geometridæ, the latter name being derived from the fact that the caterpillars, known as "loopers," seem to measure their stride when moving about their food-plant. There are only five species of the genus found in Australia, and all may be found within a radius of fifty miles of Melbourne. From their handsome appearance—that of burnished silver, with brown markings—they are popularly known as the "Silvery Wattle-Moths," the latter part of the name arising from the fact that the larvae of all are found on some species of *Acacia* (Wattle) or another. The most frequently met with species is *Thalaina clara*, the food-

plants of which are the Black Wattles, *Acacia decurrens* and *Acacia mollissima*. The forewings of perfect insects are silver, with dull red markings, which resemble the letter W; hindwings silver, with a dull brown spot near the hind margin. The food-plant of *Thalaina angulosa* is the Golden Wattle, *Acacia pycnantha*, the forewings of perfect insect being silver, with broad dull red markings that resemble the letter W, hindwings silver, with a long dark brown patch across the hind margin. *Thalaina punctilinea*.—The food-plant of this species is the Blackwood, *Acacia melanoxylon*, forewings of perfect insect being silver, with a small dull red line along the base; hindwings silver; under side of the wings have a blotch half dull red and dark brown, which shows through the wing near the hind margin. *Thalaina inscripta*.—The food-plant of this species is the Silver Wattle, *Acacia dealbata*, forewings of perfect insect being silver, with brown markings; hindwings silver, with a dark brown spot near the hind margin. *Thalaina selena*.—The specimen exhibited at the October meeting was captured at Ferntree Gully by Mr. C. Oke, and it is very likely that the larvae will be found on the Silver Wattle, *Acacia dealbata*, or the Blackwood, *Acacia melanoxylon*, forewings of perfect insect being silver, with dull red markings. The markings resemble the letter V. Hindwing silver; under side of the wing has a blotch half dull red and dark brown, which shows through the wing near the hind margin. There is only one brood in a season of these beautiful moths. The larvae are full grown by the end of September. When full grown the larvae make for the base of the tree, where they burrow a couple of inches into loose soil, and under dead leaves near the foot of the tree. If there is a patch of dust at the base of the tree caused by the boring beetle or wood moth larvae, the Silvery Wattle-Moth caterpillars like to burrow into this dust and commence to spin a small, round, silken cocoon. The outside structure of these cocoons is strengthened with the material into which the caterpillars burrow. The majority of Silvery Wattle-Moth larvae have pupated by the middle of October. The perfect insects are on the wing in the following March, April, and May, April being the month in which the greatest numbers are found on the wing.—L. THORN.

BEETLES IN PEPPER.—The small tin of cayenne pepper exhibited to-night was, some time back, discovered to contain larvae of a beetle; these were allowed to remain in possession of the pepper until they were fully grown, when pupation took place. The perfect insects, recently emerged, are a common little Ptinid beetle, *Phinus exulans*, Erich. (Carded specimens of beetle exhibited.)—H. W. DAVEY, F.E.S. 12th Nov., 1923.

The Victorian Naturalist.

Vol. XL.—No. 9. JANUARY 10, 1924.

No. 481.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 10th December, 1923.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about sixty members and visitors were present.

REPORTS.

A report of the excursion to Belgrave on Saturday, 17th November, was given by the leader, Mr. E. E. Pescott, F.L.S., who said that quite a number of members had taken part in the excursion. Leaving town by the early train, the forenoon had been spent in the neighbourhood of the Sherbrooke Falls, where the fern vegetation is very fine. The differences between the different species were pointed out, and an instructive hour or so spent, notwithstanding the discomfort of some heavy showers. A return was made to Belgrave to meet the afternoon train, by which several members journeyed up, when a visit was paid to the fine garden and fern gully of Mr. J. H. Maddock. Here were seen a good variety of native shrubs, &c., representing several States. They are set out in the grass on the hillside with just a small space cleared around them, and are thriving well. In the garden was a fine plant of the rare *Lilium giganteum*, of China and Japan. When in flower the stem is about ten feet in height and crowded with handsome blooms. The fern gully was in splendid order and contained a large variety of ferns, many exotic species growing alongside its original occupants. Here was seen a fine specimen of the Tasmanian Leathcrwoud, *Encyphia Billardieri*, Spach. (Fam. *Saxifragaceæ*). This tree is about ten feet in height, and is the finest specimen known in cultivation. The members were most hospitably entertained by Mr. and Mrs. Maddock at luncheon and afternoon tea, and the outing was greatly enjoyed.

On the motion of Messrs. E. E. Pescott, F.L.S., and Mr. C. Lambert, a vote of thanks was carried to Mr. and Mrs. Maddock for their hospitality on the occasion of the excursion to Belgrave on Saturday, 17th November.

A report of the excursion to Diamond Creek on Saturday, 24th November, was forwarded by the leader, Mr. C. French, jun., Government Entomologist. There was a good attendance of members, and the afternoon was spent principally in the search for scale insects and kindred pests. A number of trees of the Red Box, *Eucalyptus polyanthemos*, Sch., were examined, and on the foliage and twigs were found a number

of remarkable gall-making scales, among which were *Apionomorpha conica*, *A. ovicola*, and *A. munica*. An Apionomorpha collected will probably prove to be new to science. At least a dozen species belonging to the genera *Lecanium*, *Aspidiotus*, and *Dactylopius* were also collected. The afternoon proved very enjoyable, the excursionists being greatly interested in this usually despised branch of entomology.

A report of the excursion to Black Rock on Saturday, 1st December, was, in the absence of the leader, Mr. J. Shephard, given by Mr. C. Daley, who said that a large party of members attended, and that an interesting afternoon was spent in examining the inhabitants of the numerous shallow pools along the shore.

ELECTION OF MEMBERS.

On a ballot being taken, Miss J. Galbraith, "Dunedin," Tyers, via Traralgon, was elected a country member, and Mr. H. McColl, 97 Walpole-street, Kew, an ordinary member of the Club.

GENERAL BUSINESS.

The president said that the committee, in accordance with the resolution passed at the October Club meeting, that members of the Plant Names Committee should be presented with mementoes of their work, had had interleaved copies of the "Census of Victorian Plants" specially bound in leather, with an appreciation of the recipients' services inserted. The members of the committee were:—Prof. A. J. Ewart, Dr. C. S. Sutton, Messrs. J. W. Audas, F.L.S., W. R. A. Baker, F. G. A. Barnard, C. Daley, F.L.S., A. D. Hardy, P. F. Morris, F. Pitcher, E. E. Pescott, F.L.S., P. R. H. St. John, and H. B. Williamson, F.L.S. He asked those members present to come forward and receive their mementoes. Dr. Sutton, Messrs. Pitcher, Barnard, Pescott, and Williamson expressed their thanks for the thoughtful action of the Club, both on their own behalf and on behalf of their absent colleagues.

PAPER READ.

By Mr. J. Searle, entitled "The Microscope, and What It Reveals."

This took the form of an illustrated lecturette, in which the author pointed out the many ways in which the microscope, besides being a source of entertainment to the casual observer, had proved itself to be indispensable in scientific investigations of all kinds as well as in modern business and factory working. He illustrated his remarks with a great variety of lantern slides depicting various branches of microscopy.

The chairman, Messrs. Barrett, Williamson, Thorn and Coghill joined in expressing the thanks of the meeting to Mr.

Searle for the very instructive and interesting evening he had provided.

EXHIBITS.

By Mr. F. G. A. Barnard.—A rare fungus, probably *Geoglossum australe* (Ascomycetes), Berk., found growing on beech trees, from head of Don River, Healesville.

By Mr. C. Barrett.—Shells of *Spckia zonata*, *Nassopsis natta*, *Neothanma tanganycicense*, collected by Dr. G. D. Hale Carpenter, Uganda Medical Service, at Lake Tanganyika, Central Africa.

By Mr. J. E. Dixon.—Thirty-two species of Victorian Coleoptera, including:—Three species of Buprestidae, probably new species; also *Stigmodera atricollis*, Saund., *S. moribunda*, Saund., *S. elongatula*, MacL., *Neocuris*, sp., from Lake Hattah district; *Aphanisticus*, sp. (rare), and a rare Elater, from Warburton district; *Belus*, sp. (?), allied to *B. regalis*, Blackb., *Melobasis ignipicta*, Kerr, from Baxter district; *Stigmodera cyanicollis*, Boisd., and four varieties from Frankston; *Orodes humeralis*, and *Hypocisseis ornata*, Cart., recently described from South Australia, from Wattie Glen (Balee) district—a Victorian record.

By Geological Survey of Victoria, per A. E. Rodda,—Agates from Beechworth district.

By Mr. C. Oke.—Hairy Cicada, *Tettigurata crinita*, from Belgrave district, 6/5/1923.

By Mr. E. E. Pescott, F.L.S.—Growing plant of the West Australian Pitcher Plant, *Cephalotus follicularis*, Labill., with pitchers well developed and large; flowers of the Coolgardie White Gum, *Eucalyptus torquata*, Turc., from a four years old plant, now flowering for the second time; two aboriginal stone axes from Western District; unusual aboriginal stone, hammer-shaped, with groove round centre, similar to stone hammers used by early Siberian natives, and, for comparison, a small stone hand-hammer, ungrooved.

By Mr. J. Searle.—Slides, under microscopes, in illustration of his lecture:—embryo of chick, human embryo, group of diatoms, group of Foraminifera, group of Radiolaria, young colony of Crystatella.

By Mr. L. Thorn.—The head and saw of three Hobson's Bay Saw-fish, *Pristiophorus nudipennis*, caught at Edithvale; also the saw of the large Saw-fish, genus *Pristis*.

After the usual conversazione the meeting terminated.

EXCURSION TO BEACONSFIELD.

THOUGH Tuesday, 6th November (Cup Day), had been looked forward to by several excursionists, the attendance was very small, probably owing to the curtailment of the railway services

on account of the police strike. On detraining at our destination we met two other entomologists, and joined forces with them. Being all entomologically inclined, the best part of the day was spent in chasing "the elusive bug," but, owing to the long spell of cold weather preceding the holiday, insect life was scarce. The *Leptospermum* was in full flower, but sterile from a collecting point of view. A nice Clerid of the genus *Trogodendron* was shaken from an *Acacia*, and two specimens of a rare *Chlamydopsis* were secured from nests of *Ectatomma* ants. Bird-life was exceptionally prolific, some forty-two species being met with during the day. Bell Miners were extremely numerous along the *Cardinia* Creek, and three nests containing eggs were seen. One clutch was accompanied by an egg of the Pallid Cuckoo—a very rare combination. Other birds found nesting were the Red-browed Finch, Spotted Pardalote, Magpie-Lark, Kookaburra, and Blue Wren. Whilst having lunch we were charmed by the antics of a beautiful male Mistletoe-bird, which stayed around our camp for a considerable time. Other interesting birds noted were the Gang Gang Cockatoo, Leaden Flycatcher, Azure Kingfisher, and Orange-shafted Fantail. Lepidoptera were scarce, but a few fine larvæ were secured for breeding purposes.—F. E. WILSON.

EXCURSION TO BRISBANE RANGES.

IN the absence of Dr. Sutton, who unfortunately missed the train, I undertook the leadership of the small party who journeyed to the Brisbane Ranges on Saturday, 10th November. As the party was not large, the Rev. A. C. F. Gates, M.A., who met the first train to Bacchus Marsh, was able to accommodate all and drive them to the ranges, a distance of about twelve miles. The road taken was that running south to Balliang from the railway viaduct near Rowsley. About ten miles out a lane was traversed which enabled us to leave the car a few hundred yards from the hills. On the rocky hillside were found specimens of *Pterostylis pusilla*, Rogers, and an interesting patch of vegetation was met with right on the saddle. Bushes of *Bossiaea microphylla*, in fruit, were abundant, and *Pultenaea Gunnii*, past its prime. *Grevillea aquifolium*, *Acacia Mitchellii*, and *Veronica persolvata* occurred sparingly, the *Acacia* being in bud. On this ridge many plants of a rare Daisy-bush, *Olearia (Aster) iodochroa*, F. v. M., were gathered in bloom, a sprig of which had been sent to me a week previously by Mr. Gates from Staughton Vale. This plant has been recorded for Victoria only from Genoa (Eastern Gippsland) and the Fainter Range by Mueller about 60 years ago, and apparently

has not been gathered since. Its leaves are somewhat like those of *O. pinnicoides*, and thus it may have been placed under that name by collectors. It may be distinguished by its violet disc florets—a feature found in only one other Victorian Daisy-hush, *O. asterotricha*—the violet-coloured edges to the involucral bracts, the pale violet, silky achenes, and the very short bristlets accompanying the pappus. The white limbs of the ray florets also show a tendency to pale violet. "Violet Aster" is rather a misleading vernacular, for that colour is not conspicuous. Another novelty collected was a small plant of the family Epacridaceæ, the position of which is not yet determined. Traversing a steep-sided gully with an almost dry creek-bed, the following species, among others, were gathered:—*Brachycome multifida*, *B. diversifolia*, and *Stellaria pungens*. The ferns gathered were:—*Asplenium flabellifolium*, *Adiantum ethiopicum*, *Pleurozorus (Grammitis) rutifolius*, and *Cheilanthes tenuifolia*, the last-named being in great abundance, and very tall. The luxuriance of *Rumex Brownii* was also remarked. Patches of the pretty introduced Toadflax (Pellisser's), *Linaria Pelisseriana*, were noted. Small plants were not neglected, and among these were *Levenhookia dubia*, *Brizula gracilis*, *Mitrasacme paradoxa*, *Calandrinia calyptata*, *Rutidosis fumilo*, and *Stuartiana Muellieri*. The eucalypts seen were *E. dives*, *E. macrorrhyncha*, *E. ovata*, and *E. viminalis*. Birds were not plentiful, the most interesting being the White-shafted Fantail and the Rufous-breasted Whistler, the latter much in evidence as regards musical display. Mr. Gates, whose knowledge of the flowers was of much assistance, and whose eye is keen for novelties, drove the party to the railway, where they entrained for home.—H. B. WILLIAMSON.

AN ORCHID NOTE.—Among the orchids exhibited by me at the recent exhibition of wild-flowers was a *Calochilus* of unusual form. It came from the Rushworth district along with other flowers. Five specimens came to hand, in none of which was the labellum fringed or bearded, as is usual in this genus. Had there been only one or two such flowers I would have regarded them as abnormal, but the number found, and the fact that in every flower on each spike the unusual formation was evident points to the possibility of an unrecorded species. A sixth specimen had formed its seed-vessel, which might indicate that it finishes flowering just as *Calochilus Robertsoni* commences its season. An endeavour will be made next season to trace this stranger and see if its characteristics are constant.—E. COLEMAN.

SPIDERS.

By S. BUTLER.

(Communicated by J. Searle.)

(Read before the Field Naturalists' Club of Victoria, 13th Aug., 1923.)

In introducing the spiders to your notice I would like to emphasize the fact that they are exceedingly interesting subjects for study, though the average person shuns and fears them, as there is a widespread belief that spiders are dangerously venomous. It is true that they can bite and inject venom into the wounds made by their fangs, but, with the exception of certain large spiders that are found in the tropics, the bite would not affect a healthy person any more than would the sting of a bee.

The fact that spiders show a higher development than any other invertebrate animal, their abundance, the many variations in the habits of the different species, and the highly-developed instinctive powers of many of them, render them eminently suitable for the purpose of a congenial study. Spiders can be found almost everywhere. When searching for them do not neglect to turn over stones, old rubbish, leaves, etc., and to look under the loose bark of trees, as these are favourite hiding-places. The trap-door and burrowing species will have to be dug out of the ground. Spiders are easily caught by placing a wide-mouthed bottle over them, if this is then inverted over a similar bottle containing 50 per cent. methylated spirit, the spider will drop into the latter, which will kill and preserve it.

In the scheme of classification spiders are placed in a group of the Arthropoda called Arachnida, between the Crustacea and the Hexapoda, or insects. The Arachnida has two sub-classes; the first is composed of the orders Xiphosura, the King Crabs, and Eurypterida, a fossil group. In sub-class two we have the following eight orders:—

Microthelyphonida.—These are minute arachnids of a translucent white colour; the abdomen is segmented, and they possess a long-jointed flagellum, carried scorpion-like above the back. They have no eyes. This is one of the least known of the Arachnids. The body and tail measure only one-twelfth of an inch in length.

Pedipalpida.—The Whip Scorpions and their allies. The most noticeable feature is the first pair of legs. They are of great length, and are used as feelers.

Scorpionida.—These are well-known animals, although it is surprising how many people call small centipedes, and other such-like animals, scorpions. The noticeable

features are the enormous pincer-clawed pedipalp and the long tail ending in a sting.

Solpugida.—This group is sometimes called Galeodes. They are large, hairy creatures, native to the hot regions, and superficially resembling spiders. They differ from spiders in many ways, in the obvious segmentation of the body suggesting insects, the pincer-like chelicera and the absence of spinning organs and lung-books.

Araneida.—These are the spiders, and will be dealt with in detail later on.

Pseudoscorpionida.—The false scorpions. They resemble a small, tailless scorpion, but are quite distinct from them.

Phalangida.—These are invariably mistaken for spiders. The distinguishing feature is that the abdomen is united to the cephalothorax by its whole breadth.

Acarina.—The Mites. The water-mites, cheese-mites, and cattle-ticks come under this group.

These eight orders belong to the Arachnida. The first and fourth orders have not been recorded in Australia, and possibly will not be unless introduced. There are two small groups that appear to belong here, and they are appended to this group, but their connection is, at its best, a remote one. They are the Tardigrades and Pentastomidae. The Pycnogonida or Sea Spiders, although they resemble spiders, are quite a distinct group of the Arthropoda.

THE ARANEIDA, OR SPIDERS.

Briefly, their life-history is:—The eggs are laid and enclosed in a silken egg-sac. Some hundreds may be deposited, which in due time hatch out as spiderlings. Some of these keep to the cocoon and web of the parent, others disperse. The Wolf Spiders, which do not spin webs, carry the egg-sac about until the young are hatched, when they cling in a group on their parent's back. Whilst growing they moult quite a number of times, and at the last moult the sexual organs appear. Their food mainly consists of insects, but large tropical species, it is said, catch and eat small birds. They only suck the juices of their victims. They capture their prey by pouncing on them or by snaring them in their webs, and kill them by an injection of venom.

The silk of spiders is used for making egg-sacs, drag lines, swathing bands to envelop their prey with, and in making the viscid thread and the hackled bands for snaring. The webs are of numerous shapes—the irregular, spun by the Theridiidae; sheet webs, funnel-shaped; and the geometrical, spun by the garden spiders. The detail of building a web is wonderful, especially the geometrical type.

External Anatomy.—The first point noticed is the division, or the "waist," of the body. The front portion of the animal is the head and thorax, fused together; this is called the cephalothorax. The rear division is the abdomen. Examining the cephalothorax, you will notice the eyes, which vary from two to eight in number. This portion of the head is known as the "ocular area." The space between the eyes and the jaws is called the clypeus. On the thorax there are lines or depressions called the striae. The under portion of the cephalothorax is protected by the sternum, a plate of variable shape usually notched at either side for the reception of the legs, and having in front a small plate hinged to it, known as the labium.

The Chelicerae.—These are commonly called the jaws, each jaw consisting of two parts—the base and the fang. The fang is hook-like; it bears the orifice of a poison gland, and can generally be folded back into a groove upon the base.

The Mouth.—A spider does not imbibe the juices of its prey through the jaws. If a spider is placed on its back and the latum is raised, whilst the chelicerae are pushed forward, no orifice is visible, but on careful examination the labium can be separated from the rostrum, and the orifice is then disclosed.

The Pedipalps are extremely leg-like feelers, and are six-jointed. In the female the pedipalp terminates with a single claw, whilst in the male, after the last moult, the pedipalp is seen to have developed a remarkable copulatory apparatus. The "endites" or maxillæ are the thickened portions at the base of the pedipalp.

The Legs are eight in number. This feature is one of the main characteristics of the Arachnida. They are seven-jointed, and are more or less thickly coated with hairs. Stouter hairs or bristles are often present, and some of the joints are furnished with spines. The tarsi terminate with either two or three claws, which are dentated. In many spiders of climbing habits there is also a tuft of club-like hairs, known as the "scopula." In the Cribellate spiders the metatarsus of the hind leg is furnished with a comb-like organ—the "calamistrum."

The Abdomen.—The abdomen varies remarkably in shape. It is marked with a great variety of colourings and patterns, some of which are wonderfully beautiful. Beneath the abdomen can be seen the orifices of the breathing and genital organs, also the spinnerets.

The Spinnerets are situated at the posterior end of the abdomen. They are normally six in number, and are arranged in various positions. The spinnerets are highly mobile appendages. They are the movable turrets on which are

mounted the projections, where the tubes from the spinning glands open. In addition to the six spinnerets, there is to be found in the Cribellate spiders the "cribellum." It is in the form of a double sieve-like plate, through which the liquefied silk passes. This is always correlated with a carding comb of curved bristles, situated on the metatarsus of the hind leg.

The breathing organs are placed well forward near the waist, on the under side of the abdomen, and are visible from the exterior as two pale, semi-circular-shaped spots, with the base of each opening on the sides of the "epigynum." The epigynum is the covering of the genital organ. The variation of its structure is an aid in determining the species.

The tracheal spiracles are present, but are only visible to the naked eye in the six-eyed spiders.

Internal Anatomy.—Alimentary System.—The mouth opens into the pharynx, continuing upwards and backwards as a narrow tube (the oesophagus), and passes right through the brain or nerve mass to the sucking stomach. This canal so far is lined with chitin. The sucking stomach is the food pump, and is actuated by strong muscles. Shortly behind the sucking stomach the mid-intestine sends, on either side, a large branch, from which five secondary branches are given off. The food then enters the hind intestine and passes into the rectum.

Vascular System.—The circulation of the blood can be observed in the legs of young spiders. The amoeboid corpuscles can be distinguished. The tubular heart is situated in the abdomen; it is a muscular tube, with three pairs of lateral openings, each furnished with simple valves. Numerous arteries leave the heart, conveying the blood to different parts of the body. There are no capillaries, but the blood is delivered into the tissues, and passes into the spaces of the body cavity between the viscera, hatching the various organs. It then finds its way to the base of the abdomen, and on to the "lung-hooks," where it is purified, and again enters the heart.

Respiratory System.—Spiders have two organs for aerating the blood—namely, the lung-hooks and tracheæ. The true spiders have one pair of lung-hooks and tracheæ, the trap-door spiders have two pairs, and the genus *Nops* has tracheæ only. A modification of this is found in *Argyroneta aquatica*, the Diving Spider, which has, in place of the lung-hooks, simple cavities, at the end of which numerous tracheæ ramify into the tissues.

The cavity containing the lung-book is known as the air vault; it is filled with numerous hollow leaves or envelopes, placed in a horizontal position. The whole lung is comparable to a letter file that has divisions composed of envelopes, the inside of the envelope containing the blood and the outside

projecting into the air cavity. There are eighty-eight of these envelopes in the lung-book of *Clubiona robusta*, a common Victorian spider.

The leaves are really a continuation of the external chitinous cuticle, but the chitin is very much thinner. Viewed in the longitudinal section, the under side is smooth, whilst the upper side is covered with small spines $1/2,000$ th of an inch in length, which are thickened at the top in the form of a small knob. The spines on the end of the leaf at the air opening branch into one another, making a hedge-like formation, and on the vertical wall of the cavity the same formation is found. Their purpose is to separate the leaves for the free access of air.

Internally the leaves have muscular supports. The muscle contains a nucleus, and is capable of expansion and contraction. Their object is to keep the leaves apart, and probably to circulate the blood or air in the lung. Viewed from above, the leaf is covered with spines, with a connecting thickening line of the membrane at their base, forming a trellis-work pattern. The muscular supports show out in the stained dissection as numerous grouped spots.

In tracing the evolution of the lung-books of the Arachnida, they show a close affinity to the Crustacea. The Crustacea have external gills. The King Crab, that is now definitely placed in the Arachnida, has external gill-books, whilst among the Arachnida we have the highly-specialized lung-book; in *Argyrodes aquatica* just the air vault, with tracheæ at its extremity; and in the genus *Nops* the lung-book is absent, and only tracheæ similar to the tracheæ of the insects are present.

Nervous System.—The centre of the nervous system is situated in the cephalothorax. It supplies nerves to the eyes and other parts. Regarding the location of some of the organs of sense, very little can be stated at present.

The eyes are sessile and immovable. In structure they are like the ocelli of insects. Externally there is a lens, succeeded by a mass of transparent cells, behind which is a layer of pigment; then come the rods and cones of the retina, to which the optic nerve is distributed. This is a reversal of the position of the retina and the pigment layer, compared with the Vertebrata.

Reproductive Organs.—The internal generative organs are situated in the abdomen, and are of a simple nature in the male. In the female the eggs project from the outer surface of the ovary, like beads, and are connected with this gland by narrow stalks. When ripe these eggs pass through these stalks, finding their way eventually through the genital opening, which is situated between the lung-books.

Poison Glands.—These glands, two in number, are in the cephalothorax, but sometimes partially, or even entirely, in the base of the chelicerae. The wall of the sac has excreting cells of a capillary nature and a thin outer layer of muscular and connective tissue. The fibres of the muscles are arranged in a spiral manner. By a contraction of these walls the contents of the bag can be forced down the narrow duct to the opening near the extremity of the fang.

Spinning Glands.—These are situated on the floor of the abdomen. There are hundreds of them; some are shaped like clusters of berries, whilst others are cylindrical and pear-shaped. Numerous tubes connect them to the spinnerets. Various kinds of silk are manufactured in this silk factory. Silk like the softest of down, to the snaring lines covered with viscid globules, can be spun at the will of the spider. The silk is secreted in a liquid form, and on coming into contact with the air it instantly solidifies into a strand of marvellous strength.

The following is a simple reference key to the families of spiders that have been recorded in Australia. First of all be certain that the creature is a spider. Look for a decided waist and the eight legs. The Phalangida and other orders closely resemble the spiders.

TRAP-DOOR SPIDERS.

Fam. Aviculariidae. Uncommon.

These spiders have four lung-books. They are visible on the under side of the abdomen. The fangs do not meet in a pincer-like fashion, but move in a vertical direction, side by side.

THE TRUE SPIDERS.

The true spiders have only one pair of lung-books, and their fangs meet in a pincer-like fashion.

Fam. Hypochilidae. Very rare; one species only, recorded from Tasmania.

This curious family has pincer-like jaws, but two pairs of lung-books, and a cribellum and calamistrum are present.

THE HACKLED BAND WEAVERS OR CRIBELLATE SPIDERS.

On the second last joint of the hind legs is a fine comb, called the calamistrum, and in front of the spinning organs is an oval plate, known as the cribellum. The snaring lines of their webs are teased out like a strand of frayed wool.

Fam. Uloboridae. Fairly common.

The most distinguishing characteristic of this family is the first pair of legs, which are much longer and stronger than the other three pairs, and the longitudinal stria on the cephalothorax is absent. The metatarsus of the hind leg is bowed in shape. They are small spiders. When at rest on their webs their hind legs are doubled up vertically, with their long front legs stretched well forward. Some weave geometrical webs, but the spiral lines are hacked.

Fam. Psechridae. Rare.

These are the only Australian cribellate spiders that have scopula (thick tufts of hairs between the claws). They have three claws; their legs are fine and long, especially the front ones.

Fam. Dictynidae. Common.

The cephalothorax is oval, with a median longitudinal stria present. The eyes are in two straight or slightly curved rows, and are of a pearly colour; the laterals are very close together. The most common member of this family is *Amaurobius robustus*, the large black spider found on our outhouses.

Fam. Oecobiidae. Rare.

The cephalothorax is broader than long, with the eyes grouped nearly in the centre of it.

Fam. Filistatidae. Rare.

The calamistrum is extremely short—about a quarter the length of the metatarsus.

The above families are all of the cribellate spiders that have been recorded in Australia.

Note that sometimes the males lose the calamistrum, or the cribellum, and in certain cases both, when they are fully matured.

THE PLAIN THREAD WEAVERS OR NON-CRIBELLATE SPIDERS.

The Six-eyed Spiders.

Fam. Sicariidae. Rare.

Fam. Dysderidae. Rare.

This family can be distinguished from the preceding one by the coxa of the first two legs being long and cylindrical, also two tracheal spiracles are visible near the openings of the lung-books.

The Eight-eyed Spiders.

Fam. Hadrotarsidæ. Rare.

A very small spider, easily distinguished by the median eyes being of a triangular shape, with three very small eyes each side of them.

Fam. Drassidæ. Very common under stones and bark.

Eyes in two straight rows, two claws; the fore spinnerets are widely separated. The spinners are visible from above.

Fam. Clubionidæ. Common.

Similar to the Drassids, only the eyes are more extended and the fore spinnerets are not separated. The Giant Crab Spiders ("Trialetelopes") are in this family.

Fam. Thomisidæ. Common.

These are the pretty, small, crab-shaped spiders.

Fam. Argiopidæ. Common.

The garden spiders. They weave geometrical webs; their spinnerets are rosette-shaped.

Fam. Theridiidæ. Fairly common.

Their spinners are similar to the Argiopidæ, and these spiders are sometimes difficult to separate from them. On the last joint of the hind legs, near the claws, are a few toothed hairs. *Latrodectus hasseltii*, the so-called poisonous red-striped spider, is in this family.

Fam. Mimetidæ. Rare.

Somewhat like the Theridiidæ and the Argiopidæ, only on the first and second legs, on the tibia and the metatarsus, on the inner side, are small, strong, curved spines, situated between longer ones. Of the curved spines, the upper one is always the smallest, and each succeeding one is longer than its predecessor.

Fam. Pholcidæ. Common.

Legs extremely long and thin. The "Daddy Long Legs" of our houses.

Fam. Hersiliidæ. Rare.

The hind spinnerets are very long—almost half the length of the legs.

Fam. Zodariidæ. Fairly common.

This and the following family resemble the Drassids, only they have three claws. It is difficult to characterize this family, as there is great variety in the genera. The following details will help:—The front spinnerets are long, whilst the others are very short.

Fam. *Agelenidae*. Fairly common.

Similar to the *Zodariidae*, only the hind spinnerets are longer than the others, and have the terminal joint narrowed towards the end, with the spinning tubes on the inner side.

Hunting Spiders.

Fam. *Lycosidae*. Very common.

These are ground spiders. They carry their cocoons about on their wanderings. When the young hatch out they cling to their parent's back. They are easily recognized by four small eyes in an even row in the front, two large on the top of the head, and two smaller ones further back. A small, decided notch is on the outer and underneath margin of the trochanter (this is the second joint of the leg).

Fam. *Pisauridae*. Uncommon.

At first sight these appear to be *Lycosids*, but their eyes are like the *Drassids*'. The trochanters are notched in a similar manner to the *Lycosids*'.

Fam. *Oxyopidae*. Uncommon.

The trochanters are notched or slightly so. Two very small eyes are in front; two large ones are next, the same distance apart; two smaller ones, widely separated from the third row; and the back row is similar to the second row. They hunt their prey like the *Attids*.

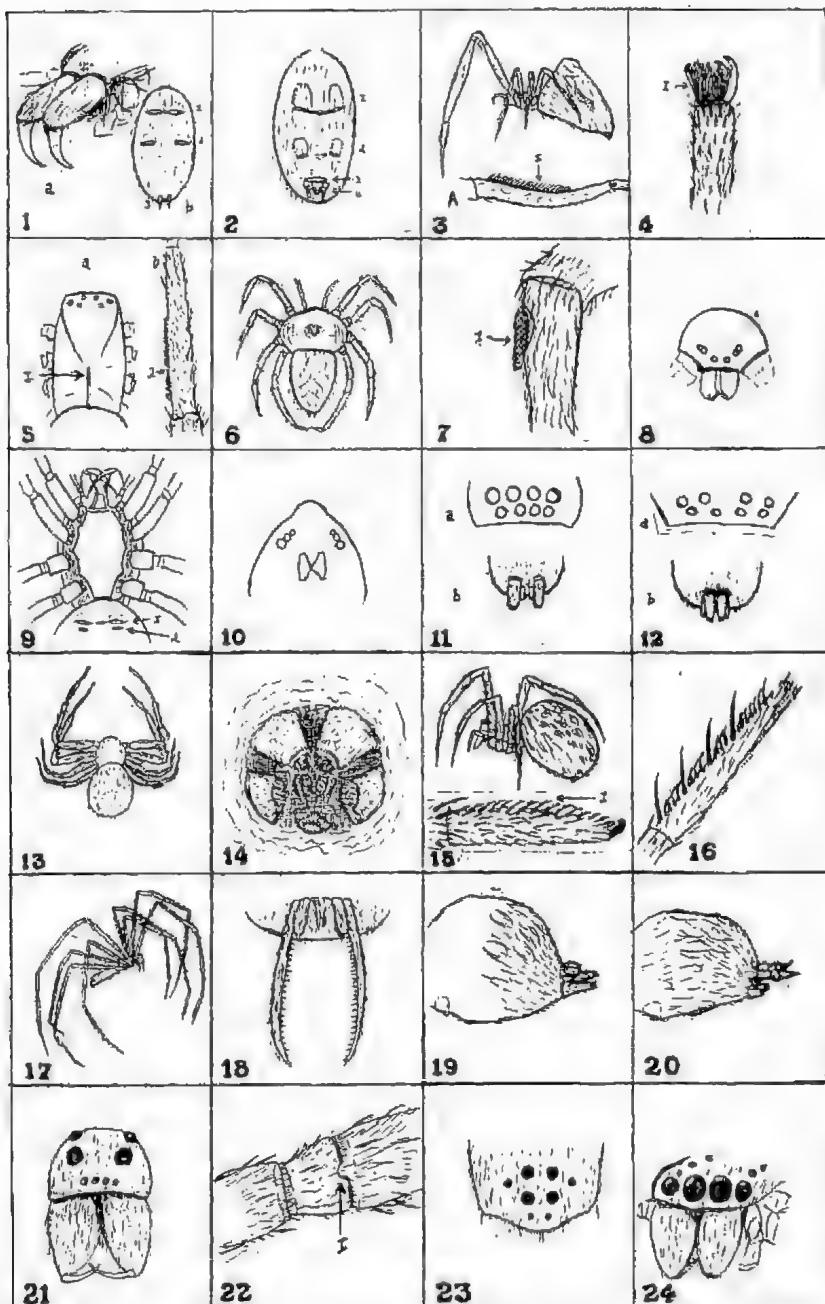
Jumping Spiders.

Fam. *Attidae*. Very common.

The jumping spiders are recognized by the four enormous eyes across the front, the other two pairs being further back.

Anyone who wishes to study the spiders will find E. Simons, " *Histoire Naturelle des Araignees*" the classic on nomenclature. This work is in French and Latin. The more modern classification, by J. H. Comstock, in his " *Spider Book*," adapted to our Australian species, would be preferable, whilst the detail on anatomy is all that is to be desired. This work is on the American spiders, and in English. " *A Catalogue of Australian Spiders*," by W. J. Rainbow, is published in the *Records of the Australian Museum*, vol. ix., No. 2, 2nd October, 1911. For illustrations of Australian spiders refer to a German work, " *Die Arach. des Australiens*," by Kock and Keyserling. All of the above are now in our Melbourne Public Library. Comstock's work of 700 pages is recent, and is still in print; published by Doubleday, Page and Co., New York.

PLATE XIV.



SPIDERS.—PROMINENT FEATURES.

EXPLANATION OF PLATE.

1. Aviculariidæ.—(a) Chelicera ; (b) under side of abdomen ; (1) first pair of lung books ; (2) second pair ; (3) spinnerettes.
2. Hypochilidæ.—(1) and (2) Lung books ; (3) cribellum ; (4) spinnerettes.
3. Uloboridæ.—(a) Metatarsus of hind leg ; (1) calamistrum.
4. Psechridæ.—(1) Scopula of tarsus.
5. Dictynidæ.—(a) Cephalothorax ; (1) median longitudinal stria ; (b) metatarsus of hind leg ; (3) calamistrum.
6. Ecobiidæ.—Notice the position of the eyes.
7. Filistatidæ.—(1) Short calamistrum on hind leg.
8. Sicariidæ.—A six-eyed family.
9. Dysderidæ.—(1) Lung books ; (2) spiracle.
10. Hadrotarsidæ.—Showing position of the eyes.
11. Drassidæ.—(a) Eyes ; (b) spinnerettes.
12. Clubionidæ.—(a) Eyes ; (b) spinnerettes.
13. Thomisidæ.—The pretty, small, crab-shaped spiders.
14. Argiopidæ.—Rosette form of spinnerettes (enlarged).
15. Theridiidæ.—(1) Toolhed hairs on tarsus of hind leg.
16. Mimetidæ.—Spines on the first and second legs.
17. Pholcidæ.—Notice the long and thin legs.
18. Hesiliidæ.—Observe the very long spinnerettes.
19. Zodariidæ.—Abdomen, showing spinnerettes.
20. Agelenidæ.—Abdomen, showing the jointed hind spinnerettes.
21. Lycosidæ.—"Face," showing the grouping of the eyes.
22. Pisauridæ.—(1) Notch on trochanters.
23. Oxyopidæ.—Cephalothorax, showing eyes.
24. Attidæ.—Notice the four enormous front eyes.

NOTES ON THE COLEOPTERA OF NORTH-WESTERN VICTORIA.

PART X.

BY J. C. GOUDIE,

(Read before the Field Naturalists' Club of Victoria, 12th Nov., 1923.)

CLERIDÆ.

This family is represented by a limited number of small but handsome beetles, often metallic in colour, and very pubescent; easily recognized by the short, clubbed antennæ, narrow form, and prominent eyes. They are mostly diurnal and carnivorous in habits, frequenting flowers and foliage in search of other small insects. I am much indebted to Messrs. A. H. Elston and A. M. Lea for the identification of the species enumerated herein. In a recent paper* Mr. Elston has drawn attention to some changes in nomenclature. Thus, *Eunatalis* for *Natalis*, *Phlogistus* for *Aulicus*, &c. He also states that *Opilo incertus*, MacL., is a synonym of *Tarsostenus univittatus*, Rossi, with this explanation:—"Macleay's name will now have to be added to the several synonyms of this cosmopolitan species."

3451. *Opilo congruus*, Newm.

This is brown, with the base, a band near the middle, and the tips of elytra yellow; the basal half of all the femora also yellow; $\frac{3}{8}$ of an inch long.

3455. *Tarsostenus univittatus*, Rossi (= *Opilo incertus*, MacL.)

A smaller species, nearly black, with a whitish transverse band behind middle of elytra.

3461. *Eunatalis porcata*, Fab.

This beetle is not unlike some longicorns, from which the short, clubbed antennæ at once distinguish it. It measures $\frac{3}{8}$ of an inch, and is reddish-brown to nearly black, without markings. Found under bark.

3464. *Blæsiophthalmus (Thanasimus) accinctus*, Newm.

This little Clerid has a wide head and large eyes, giving it somewhat the appearance of a small "tiger beetle." It is black, with reddish legs; on the middle of the elytra is a narrow yellow transverse band; behind this is a yellow longitudinal spot, or vitta, on the suture. Taken on tree-trunks.

Phlogistus (Aulicus) dives, Blackb.

3485. *P. imperialis*, Gorh.3486. *P. instabilis*, Newm.

P. dives has the head and prothorax greenish-blue; elytra purple, with a yellow band in front of middle; and a red spot

* Tr. Roy. Soc. S. Aust., xiv. (1921).

on each near apex; $\frac{1}{4}$ of an inch long. *P. imperialis* is metallic purple, the under side blue and green. The elytra are strongly punctate, except the shoulders and apical fourth. In some specimens the upper surface is brilliant green. *P. instabilis* is a similar beetle, and is more often seen. The colour is variable, ranging through all shades of green, blue, and purple.

3501. *Trogodendron fasciculatum*, Schrib.

One of our largest species, measuring nearly an inch in length. It is black, with yellow antennæ. The elytra are coarsely punctate, with a broad pre-apical band of velvety-black hair, a tuft of the same on the base, and two small yellow spots near outer margin. On a hot day this beetle is very active and restless, reminding one of a wasp. Mr. Froggatt says it is parasitic on the pupæ of some of the large wood-moths.

3512. *Zenithicola funesta*, Chevr.

A smaller species than the last mentioned. Black, with much white pubescence. The scutellum and two spots near apex of each elytron clothed with short white hairs. Rare locally.

Eleale latipennis, Elston, Tr. Roy. Soc. S.A., xlv., 1921,
p. 163.

Dark violet, or nearly black. The scutellum and extreme apex of elytra are clothed with short white hairs. It measures $\frac{1}{4}$ of an inch.

3537. *E. pulchra*, Newm.

A larger beetle ($\frac{1}{2}$ an inch), dull purple or violet, with a yellow transverse band on elytra behind the middle; antennæ yellow.

3562. *Stigmaticium ventrale*, MacL.

Somewhat resembles *Trogodendron* on a small scale. The ventral surface is pale red. It is about $\frac{1}{2}$ an inch in length, and found under bark.

Lemidia australis, Lea, Ann. Soc. Ent. Belg., tome li., 1907, p. 346.

3566. *L. bifurcata*, Gorh.

L. meridionalis, Lea, l. c., p. 359.

3589. *L. rufa*, Gorh.

L. villosa, Lea, l. c., p. 357.

The species of *Lemidia* are handsome little beetles, under $\frac{1}{4}$ of an inch long. Mr. A. M. Lea, who has described a considerable number of new species, remarks:—"The genus *Lemidia* is one of the most typical of Australian Clerides, and is confined (with the exception of a single species from New Zealand) to Australia and Tasmania."

3603. *Pylus satius*, Newm.

A concolorous brown beetle, $\frac{1}{2}$ an inch long, having the sides

of prothorax strongly toothed. Found on tree-trunks under bark, rarely in the Mallee, though it is a common southern species.

3610. *Necrobia rufipes*, De Geer.

An introduced, carrion-feeding beetle. It is about $\frac{1}{2}$ of an inch in length, and is blue, with red legs.

LYMEXYLONIDÆ.

3613. *Lymexylon australe*, Er.

This is a strange-looking insect. A specimen in my collection (which was taken on the wing, at sunset) measures slightly over an inch, and is dark brown or nearly black. The elytra are very short ($\frac{1}{3}$ of an inch), becoming very narrow (inner margins divergent), roundly pointed at apex. The ample flight-wings are, of course, only partly covered by the elytra. An isolated form. It was described by Erichson in 1842, and seems to have been the only known Australian species until, 57 years later, the Rev. T. Blackburn described another under the name of *L. adelaide*.

PTINIDÆ.

An interesting family of small beetles containing some remarkable insects. In most of them the apterous body is oval and strongly convex; the short prothorax partly conceals the head from above. There are several introduced species, commonly found about dwellings, &c. In the Mallee we have five native species, all living as inquilines or guests in the nests of ants.

3622. *Ptinus fur*, Linn.

An introduced species.

3626. *Diphobius familiaris*, Oll.

Shining jet-black.

3631. *Ectrephes kingii*, Westw.

Minute, reddish-castaneous, taken with small black ants.

3634. *Diplocotes foveicollis*, Oll.

Reddish-castaneous; with a deep fovea in prothorax; under bark, with *Cremastogaster laeviceps*.

D. strigicollis, Lea, Proc. Roy. Soc. Vic., xxiii. (new series), part 1, p. 221.

Paussoplinus laticornis, Lea, l. c., xvii., part 2, p. 382, plate xxvii., fig. 7.

This little chestnut-brown beetle combines, in its structure, the characters of two families—viz., Paussidæ and Ptinidæ. As Mr. Lea has pointed out, the head, prothorax, elytra, and abdomen are those of a typical Ptinid, while the antennæ have the broad, flattened form of the Paussidæ, thus forming a very

definite connecting link between the two families. The first specimens were taken at Birchip many years ago by the writer, in a nest of the wood ant, *Iridomyrmex nitidus*. This ant is found in large colonies living in hollow logs and stumps, and is a favourite host with myrmecophilous insects, such as beetles of many kinds, crickets, cockroaches, wasps, larvae of moths, springtails, &c.

BOSTRICHIDÆ.

This is a small family of wood-boring beetles. They are cylindrical in shape, with the head placed on the under side of the prothorax; antennæ short, clubbed.

3642. *Bostrychopsis jesuita*, Fabr.

The well-known "auger beetle," which bores neat, round holes in the wood of various trees and shrubs, including fruit trees. *Pittosporum phylliraeoides*, a small tree or shrub, known as the "Mallee Willow," is sometimes riddled by this beetle, which is black, with roughly punctate elytra, and measures from $\frac{1}{2}$ to nearly $\frac{3}{4}$ of an inch in length. The larva is a short, stout, yellowish-white grub.

3643. *Xylion collaris*, Er.

Xylobosca mystica, Blackb. (?)

Xylopsocus bispinosus, MacL.

Xylotellus lindi, Blackb.

The above are small, shining, reddish-brown species, *X. collaris*, the largest, being slightly under a quarter of an inch in length. It is well known as a fruit-tree pest. I once found a Murray Pine badly infested with this species. The smaller species are mostly found breeding in the small branches of various acacias.

DUNK ISLAND.—What Australian naturalist has not heard of Dunk Island, that naturalists' paradise off the coast of Northern Queensland, where the late Mr. E. J. Banfield made his home for many years, and, under the *nom-de-plume* of "The Beachcomber," issued his delightful nature-study books? In the *Australian Museum Magazine* for October (No. 10, the concluding part of the first volume) Mr. Chas. Barrett, C.M.Z.S., has a pleasant article dealing with a visit to the island as the guest of Mr. Banfield, in which he briefly describes the many interesting sights which there met his view. The birds, the butterflies, the reptiles, all come in for a share of his remarks, and one ceases to wonder that the late Mr. Banfield cut himself off from the world, so to speak, for so many years when he had so much to interest him and wonder at on every hand, and, as nothing was molested, the opportunities for unravelling some of the mysteries of nature were many.

GORDIUS WORM.—The worm exhibited at the November meeting was from Buna Bay, Papua, and may be one of the Gordiidae of the Nematomorpha, parasitic worms usually found attacking aquatic insects, although some species use land snails as hosts. On page 170 of the "Cambridge Natural History," "Worms, Rotifers and Polyzoa," it states:—"The life-history of Gordius comprise four stages: the early development of the egg, the first larval form, the second larval form, and the sexually mature form. Both larval forms are parasitic, and during their life they are actively engaged in feeding. The free form, on the other hand, takes no nourishment, and is exclusively engaged in reproduction." These parasitic worms in some instances appear to use a secondary host, somewhat similar to that of the sheep-fluke. The larval Gordius that has become parasitic on the aquatic larva of an insect may gain access to a fish that eats the parasitized insect larva, the fish becoming the secondary host; ultimately, however, it leaves this host and makes its way to land. The specimen shown is very close to being six feet long when it is fully extended, and when alive was chiefly remarkable for its extremely slow movement along the ground, looking like a piece of animated thin wire. I have a slightly smaller specimen from the Yodda Valley, Papua.—H. W. DAVEY, F.E.S.

"THE GUM TREE."—The September (1923) issue of *The Gum Tree*, the official organ of the Australian Forest League, which is owned and published by the Victorian branch of the League, contains the report of the committee of the branch for the year ending 30th June. The committee reports that useful work in several directions had been accomplished, though hampered somewhat by want of financial support. An interesting illustrated article by Mr. E. E. Pescott, F.L.S., entitled "The Australian Flora from an Ornamental Aspect," deals with the use of various eucalypts as specimen trees in parks and gardens. The characteristic features of each species is given, with the treatment it should receive under cultivation.

PLYWOOD.—The *Australian Forestry Journal* for October, 1923, contains an interesting article dealing with the production of plywood in various countries. This material is now in everyday use for various purposes, not only as linings in the construction of houses, but even for box-making, such as tea chests, for which it has proved itself stronger than solid wood. An important factor in the preparation of plywood is the glue or adhesive mixture used to cement the sheets together; this may be waterproof or non-waterproof. Into the latter casein, a milk product, is said to enter largely. It is calculated that the use of plywood is the most economical way of using timber for a great variety of purposes.

The Victorian Naturalist.

VOL. XL.—No. 10. FEBRUARY 7, 1924.

No. 482.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria-street, on Monday evening, 14th January, 1924.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about fifty members and friends were present.

CORRESPONDENCE.

From Mr. H. Hughes, tendering his resignation as librarian of the Club, as he intended visiting England for some months.

It was decided to accept the resignation with regret, and to thank Mr. Hughes for his services.

REPORTS OF EXCURSIONS.

A report of the excursion to Belgrave on Saturday, 15th December, was given by the leader, Mr. C. Oke, who said that, fortunately, he had been the only member to attend the outing. Other members had probably not gone owing to the threatening look of the weather. These threats were carried out, as it rained incessantly from a quarter to 1 till 5.30 p.m. After the rain ceased it was possible to do a little collecting, principally of ants, but the best capture for the day was a very fine female specimen of a rather scarce beetle, *Macrones capita*, Pasc., a pretty dark red and black wasp-like longicorn.

A report of the Christmas excursion to the National Park, Wilson's Promontory, was given by the leader, Mr. C. Daley, B.A., F.L.S., who said that the week's visit had been undertaken by a party of sixteen, including six ladies. The accommodation afforded by the new Chalet had been much appreciated, and, with this base, future visits to the Park would be very much easier to plan. A fair amount of country had been traversed, and a general idea of the nature of the Park gained. Sealers' Cove, on the eastern side, had been visited by a small party, and the rich vegetation on that side of the Promontory seemed to warrant a closer investigation on some future occasion; at any rate, the Myrtle Beech, *Neofagus Cunninghamii*, was definitely ascertained to grow in that vicinity. The entomologists and ornithologists had noted many species in their respective domains, whilst the photographers had secured many mementoes of their visit. The trip was greatly enjoyed by all who took part in it, though missing the tide at the outset caused some inconvenience and loss of time. Mr. L. Thorn read a list of the birds seen during the trip across Corner Inlet,

and of those seen in the Park, numbering thirty species, none of which were particularly rare.

ELECTION OF MEMBERS.

On a ballot being taken, Dr. W. Heber Green, University, Carlton; Dr. W. M'Raee Russell, 608 Nicholson-street, North-Fitzroy; and Mr. J. Strong, 47 Elizabeth-street, Elsternwick, were unanimously elected ordinary members of the Club.

GENERAL BUSINESS.

The chairman asked for nominations for the librarianship, but as no one present was prepared to accept the position the matter was referred to the committee.

PAPER READ.

By Mr. E. E. Pescott, F.L.S., entitled "Notes on Victorian Orchids, No. II."

The author gave an account of the orchids which have been recorded for Victoria since his previous paper published in the *Victorian Naturalist* for January, 1921. Thirteen new species are recorded, of which five species are new to science. The most interesting of the new species being perhaps *Pterostylis recurva*, Rogers, which is found in the Dandenong Ranges. It seems strange that this comparatively large orchid had been so long overlooked, but probably it is that no one looked for a *Pterostylis* in the middle of summer. One species hitherto regarded as such had been reduced to a variety—viz., *Prasophyllum odoratum*, Rogers, var. *album*, Rogers. Two new varieties are recorded, both coming from Alberton. A note is also recorded of a white variety of *Thelemitra epipactoides*, F. v. M. The change of name of two genera is noted. This is due to priority of nomenclature. Thus the genus *Corysanthes*, of which there are four species in Victoria, has been changed to *Corybas*. It is also recorded in the Census that the genus *Drakaea* becomes *Spiculosa*, there being two species recorded for Victoria.

The paper was illustrated with lantern slides of many of the species mentioned.

HOLIDAY EXPERIENCES.

Mr. H. B. Williamson, F.L.S., with the aid of lantern slides, gave some account of a Christmas trip to Eastern Gippsland and of a visit to Mildura in the September vacation.

A note on the birds of Lardner, West Gippsland, was contributed by Miss C. C. Currie, being birds seen from her verandah during the holidays.

REMARKS ON EXHIBITS.

Mr. J. Searle, with the aid of enlarged drawings, called atten-

tion to exhibit of the life-history of *Obelia*, a hydroid polyp. This organism has two modes of reproduction, and lives either a free-swimming or a fixed existence.

EXHIBITS.

By Mr. C. Daley.—Grinding stone of dune sandstone, also flint core, with chipped cutting edge, from coastal middens, Wilson's Promontory.

By Geological Survey of Victoria, per Mr. A. E. Rodda.—Silicified wood, flaked by aborigines, from Jamieson, Vic.

By Mr. L. Hodgson.—Flowers of *Banksia serrata*, Saw Banksia; *Banksia integrifolia*, Coast Banksia; bark of *Melaleuca ericifolia*; quartz scrapers and flints, from aboriginal kitchen middens; quartz, showing bands of orthochrome clays; fossilized shell—all collected at National Park, Wilson's Promontory, January, 1924.

By Messrs. A. G. Hooke and A. J. Tadgell.—Living and dried plants collected on and leading up to Mount Bogong, North-East Victoria, during January, 1924. Living.—*Drosera arcturi*; *Prasophyllum Tadgellianum*, Rogers; *Brachycome Tadgelli*, Tov. and Morris; *Veronica serpyllifolia*, L., all from 5,800 to 6,500 feet above sea level. Dried specimens.—*Caladenia angustata* (robust form, in bloom), *Choretium lateriflorum* (in flower, 4,000 feet), *Dichondra repens* (4,000–5,000 feet, does not appear to have been recorded at this height), *Drosera arcturi*, *Eucalyptus Sieberiana* (4,500 feet, locally known as Woolly-but), *Hymenanthera dentata* (*H. banksii*, alpine spinous form, var. *angustifolia*, with lateral flowers on the underneath side), *Hierochlon redolens*, R. Br., Sweet Holly-grass, *Hovea longifolia* (white flowers, an unusual colour, flowers should be purple); *Dianella tasmanica* also exhibited white flowers instead of normal sky-blue), *Lycopodium clavatum* (grows among rocks), *L. selago* (rare, grows along creek banks), *Oxylobium alpestre*, *Orites lancifolium* (with Grevillea-like flowers), *Oreomyrrhus pulviniflora* (with flowers), *Podocarpus alpina* (in flower, pollen easily disturbed when plant is handled), *Ranunculus Muellieri* (previously unrecorded for Victoria; *R. lappaceus* and *R. Gunniana* for comparison), and *Trichomanes humile*, Short Bristle-Fern (previously only recorded for Dandenong Ranges).

By Mr. W. H. A. Roger.—Felt-like ball obtained from the stomach of a sheep at Gol Gol station, N.S.W. The specimen was originally covered with a thin, light-coloured skin, of which portion only remains; such formations are occasionally found in the stomachs of sheep, especially during a drought, and are of different shapes and sizes, some being perfectly round and as large as a cricket ball; the female of *Apionomorpha fletcheri*,

a gall-making coccid (scale insect), a growth resembling a wooden apple, on slender branch of tree, picked up on the bank of the Murrumbidgee River, near Hay, N.S.W.

By Mr. J. Searle.—Life-history of *Obelia*, a hydroid polyp.

By Mr. L. Thorn.—A case containing 120 specimens of insects collected at National Park, including 12 species of Buprestids and 12 species of other beetles, 7 species of flies (Diptera), 2 species of wasps, 1 species of small grass Cicada, 6 species of Skipper Butterflies (Hesperiidae), and 2 species of Lycanid Butterflies ("Blues"), and 7 species of moths—collected during National Park excursion.

After the usual conversazione the meeting terminated.

EXCURSION TO ELTHAM.

IT was gratifying that so many members resisted the temptations of Henley Day, on Saturday, 27th September, in order to have an afternoon with the birds at Eltham. The first nest visited was that of the Yellow Robin, *Eopsaltria australis*, a beautiful bark-covered nest, situated in a sapling in a quiet spot. These birds are very numerous this season. Close by was the nest of an English Blackbird which the young had just vacated. In the same gully were found nests of numerous small birds, such as the Brown Tit, *Acanthiza pusilla*, Striated Tit, *A. lineata*, Yellow-faced Honey-eater, *Philotis chrysotis*, White-plumed Honey-eater, *P. pennicillata*, and Spinebill, *Acanthorhynchus tenuirostris*, &c. The beautiful singing notes of the Grey Thrush, *Colluricinclia harmonica*, were greatly in evidence all the afternoon. Passing over the hills towards the valley of the Diamond Creek, which, owing to the recent floods, was not so alive with birds as usual, the nest of the Olive-backed Oriole, *Oriolus sagittula*, was seen hanging in the swinging bough of a Yellow Box, *Eucalyptus melliodora*, while close by, in the side of a White Gum, only about three feet from the ground, was seen the nest of a Grey Thrush. In the fallen branch of a Red Box, *E. polyanthemos*, a pair of Wattle-birds, *Acanthochæra carunculata*, had their nest, from which two young had recently left. High up in a Stringybark-tree was a nest of the White-winged Chough, *Corcorax melanorhamphus*. Many other birds were noted during the afternoon, among them being the Black-faced Cuckoo-Shrike, *Graculoides melanops*, and the White-shouldered Caterpillar-eater, *Lalage tricolor*. The afternoon quickly passed, and the members returned to town well satisfied with their outing.—W. C. TONGE.

[This report was unfortunately crowded out at the time, and has since been overlooked.—Ed. Vic. Nat.]

THE PLANTS OF THE "WHIPSTICK" SCRUB, BENDIGO.

By D. J. PATON

(With Map.)

(Read before the Field Naturalists' Club of Victoria, 8th Oct., 1923.)

Introductory.—Seventy-two years ago, as everyone knows, Bendigo awoke suddenly from the sleep of ages. Its pastoral seclusion was rudely invaded by a host of gold-seekers, and it became within a few short months a hive of industry. From the centre, where the city of Bendigo was shortly to arise, venturesome spirits struck out in all directions, wherever indications pointed to the possibility of gold being found.

Some of these, doubtless, pushing through the bush northward, came to a land where Ironbark, Box, and Stringybark were replaced by dense thickets of shrubby eucalypts with slender stems, intertwined with thick tangles of parasitic creepers. The name of "Whipstick" became applied to these dwarfed "gums," and hence the region where they grew was called the "Whipstick Scrub," or simply "the Whipstick."

This country proved to be auriferous, and seems, in the "early days," to have supported a considerable mining population, whilst—if contemporary accounts are to be believed—some who desired to avoid publicity found, in its almost impenetrable recesses, the seclusion and asylum they sought. The early inhabitants have left traces of their industry in scarred hillsides and excavated gullies, whilst often the remains of a hearth, a bit of crumbling mud-brick wall, or even a clump of Iris, Agave, or Cactus is all that remains to mark the site of their dwellings.

With the passing of the golden age the "Whipstick" seems to have returned to something of its former quietude, for agriculture passes by its barren hills for the happier regions further north. More recently, however, the eucalyptus distiller has been attracted by the high oil content of the "mallees," particularly the "blue," *Eucalyptus polyanthemos*, and the "green," *E. viridis*. The result has been the cutting down and partial clearance of large areas of these and other species. Roads and tracks in all directions through the scrub now make it easy to explore without the risk—an ever-present danger in the "early days"—of becoming hopelessly "bushed." But as yet the attacks of man have not appreciably lessened the area of the "formation," though its appearance, and to some extent its composition, have been changed.

The flora of the Whipstick, though not remarkably rich in species, is yet of considerable interest. Its study has been to me a source of great pleasure, and I wish to place before you

to-night some results of observations made at various times through a period of several years.

Location and Extent.—In the map accompanying this paper an attempt has been made to indicate the position and limits of the "Whipstick." It has not always been easy to do this with accuracy. In popular speech, a large and rather indefinite tract of country is called "Whipstick." Here, however, the term has been restricted to those areas where one or more of the "mallee" eucalypts actually occurs as a dominant note in the vegetation. It will be seen that in a south-westerly direction it reaches Lightning Hill and Myer's Flat, on the confines of Eaglehawk. To the north-west it extends within a mile of Neithborough and Sebastian, and, in the extreme north, to the vicinity of Kamaronka, whilst its eastward prolongation reaches a point three miles to the north of Goornong. The total area may be stated approximately at 70 square miles.

The Environment.—To the non-geological observer there does not seem to be much difference between the ordinary Bendigo auriferous formation and the ground occupied by the Whipstick. The latter will be found to correspond fairly closely with the block of Ordovician occurring north of Eaglehawk and the Bendigo Creek valley (which turns east near Huntly), and extending north almost to Kamaronka. These arid hills, mostly of small elevation, seem tumbled together almost without order, and, as compared with the zone of rich, auriferous reef country in Bendigo, are irregular and uncertain in their quartz formations.* For the most part, however, they lie more or less definitely east and west, so that the roads which traverse the scrub from south to north climb low ridges and dip into gullies in monotonous alternation. These roads provide the best means for the exploration of the district, each forming, as it were, a section across the "formation."

The gullies of the Whipstick show nothing in the way of permanent streams, nor are natural springs in evidence. Conditions are altogether drier than in the country to the south and east of Bendigo, where ranges of higher hills, intersected with deep gullies, and running approximately north and south, are separated by valleys bearing more or less permanent creeks.

To whatever extent the vegetation may be influenced by geological or climatic conditions, it certainly presents, when compared with the ordinary Bendigo flora, many features which entitle it to rank as a distinct botanical region. It has close affinity with the Inglewood "mallee," whilst it is interesting

* For this note I am indebted to Mr. C. Daley, B.A.

to note, on the other hand, that the flora of, say, One-Tree Hill or Mandurang is almost identical with that of Castlemaine, though separated from it by a broad belt of granite country.

General Aspect.—It may be well to give at the outset some account of the general aspect of typical "Whipstick" and its more frequent constituents.

"*Shrubby Eucalypts.*"—The most obvious feature is, of course, the association of shrubby eucalypts which forms, for the most part, the uppermost "story" of the vegetation. It contains at least four species of *Eucalyptus*—*E. viridis*, Green Mallee, *E. polybractea*, Blue Mallee, *E. Behriana*, Bull Mallee, and *E. incrassata*, Yellow or Giant Mallee. These occur in varying proportions in different parts, and only in a few localities are all four mingled. Their height also varies considerably—from less than four to more than seven metres. The south-western portions of the scrub carry *E. viridis* almost exclusively, whilst in the central region it occurs mixed with *E. polybractea* in pretty equal proportions, though the latter becomes the commoner as the eastern limits are approached. In the extreme east Green Mallee is rare. *E. Behriana* occurs over a wide area, especially in the gullies, and is generally associated with the two previous species, but especially with *E. polybractea*. On the northern fringe, where it becomes almost arborescent, it occurs mingled with *E. incrassata*. The last-named, except for one or two isolated patches, is found only towards the northern limits, where it attains a large size. Though sometimes occurring almost pure, it is usually associated with *E. Behriana* and *E. polybractea*. (*E. odorata* possibly occurs in the extreme north, but the identification of this species is not conclusive.)

A few tall shrubby plants may be considered part of this "story"—for instance, the taller forms of *Maclearia decussata* and *Acacia retinodes*, a form of *Casuarina lepidophloia*, *Exocarpus cupressiformis*, and, in some localities, *Myoporum platycarpum* and *Melaleuca parviflora*. *Eucalyptus polyanthemos* in a stunted form is also of frequent occurrence.

Associated especially with this layer of the scrub is the parasitic climber *Cassytha melantha*. This exceedingly common plant forms impenetrable tangles between and over the different plants comprising the scrub, assuming all kinds of weird forms. Its weight is often sufficient to break down its unfortunate victims. All the species of this story, and many smaller plants, are attacked with avidity, but evidently *Eucalyptus viridis* is its favourite host. Strangely enough, that other forest pest, *Loranthus pendulus*, seems to be completely absent from the Whipstick, though common enough in other parts of the Bendigo district, whilst *Cassytha melantha* is of rare occurrence.

except within the Whipstick. Two non-parasitic climbers may be mentioned here. *Billardiera cymosa* is well distributed, though not very common, whilst *Clematis microphylla* occurs in the northern fringe.

Trees.—Even in the central Whipstick patches of truly arborescent eucalypts occur, standing out above the shrubby forms. *E. sideroxylon* and *E. leucoxylon* are the usual species, the latter favouring the gullies, where it sometimes attains a considerable height. *E. hemiphloia* is of frequent occurrence in the north, whilst both it and *E. macrorrhyncha* are found near Eaglehawk.

Melaleuca Scrub.—Where the "mallee" scrub is very dense little undergrowth occurs, except a few shrubs such as *Acacia acinacea*, or an occasional orchid. In many localities, however, there is comparatively little of the tall scrub, and in such places there is a very dense undergrowth, mostly composed of a few species. Probably this condition is in part natural, but generally it appears to have been a result of cutting the eucalypts for oil-distillation. Over the large area where this has taken place the scrub has been reduced to a height seldom exceeding two metres, and frequently less. The growth which has partially replaced it consists of shrubs of a height from one to two metres, which are often more conspicuous than the "mallees" themselves.

Melaleuca uncinata is by far the commonest constituent of this "story," and is usually associated with *Casuarina distylia*, dwarf forms of *Melaleuca decussata*, *Acacia pycnantha*, *A. diffusa*, *A. hakeoides*, *Hakea rugosa*, and *Bursaria spinosa*. Plants like *Leptomeria aphylla*, *Loftuspermum myrsinoides*, *Melaleuca Wilsonii*, also occur frequently, and some shrubby composites, such as *Cassinia arcuata* and a form of *C. aculeata*, are conspicuous in this layer. These form a dense scrub, waist or shoulder high, which is often very difficult to penetrate, and bears a fancied resemblance to the Melaleuca scrubs of some coastal areas.

The Underscrub.—Growing beneath and between the plants composing the taller shrubby "stories" already described, and more abundant in partially cleared areas, is a large assemblage of low shrubs, often diffuse or prostrate. These form a distinct layer or "story" of plants less than a metre high, though some of them occasionally push up among their taller brethren of the next "story." Of frequent occurrence in this group, which includes a large number of plants of decorative value, are the following:—*Eriostemon difformis*, *Crowea exalata*, *Correa speciosa*, var. *normalis*, *Daviesia genistifolia*, *Eutaxia cuneifolia*, *Dillwynia ericifolia*, *Pultenaea pedunculata*, *P. largiflorens*, *Acacia obliqua*, *A. vomeriformis*,

A. acinacea, *Pseudanthus ovalifolius*, *Hibbertia stricta*, *H. acicularis*, *Hybanthus floribundus*, *Baccharis ramosissima*, *Micro-myrsus ciliatus*, *Calythrix tetragona*, *Boronia anemonifolia*, *Grevillea lanigera*, *Olearia teretifolia*, *Helichrysum obcordatum*, *H. adnatum*, *Dampiera lanceolata*, *Goodenia varia*, *G. amplexans*, *Westringia rigidula*, *Prostanthera aspalathoides*, *P. hirtula*, *Astroloma humifusum*, *Melichrus urecolatus*, and *Brachyloma daphnoides*. Of more limited distribution are *Logania floribunda*, *Phebalium obcordatum*, *Cryptandra amara*, *Grevillea rosmarinifolia*, *Acacia lineata*, and *Olearia floribunda*. *Cassytha glabella* is the common parasite of this "story."

Herbaceous Plants.—The community of herbs, if we except such perennials as *Loudonia Behrii* and *Dianella revoluta*, is not conspicuous in the Whipstick proper. The orchids—of which more anon—are its principal constituents. Four *Droseras* are found, *D. Menziesii* being the common species. In most places the ground is bare of grass except for an occasional tuft of *Danthonia penicillata*, *Stipa pubescens*, *S. setacea*, or *Poa cespitosa*. The herbs listed below occur mainly near the fringes of the Whipstick, and under somewhat moister conditions. The pretty herbaceous twiner, *Thysanotus Patersoni*, is well distributed throughout the formation.

Minute Plants.—A number of very small herbs form a group by themselves. Such are *Millotia tenuifolia*, *Brachycome collina*, *Rutidosis Pumilio*, *Centrolepis strigosa*, *Hydrocotyle capillaris*, *Crassula Sieberiana*, *C. macrantha*, *Levenhookia dubia*, *Calandrinia calyptata*, and *C. pygmaea*. The last-named is probably the smallest flowering plant in the Whipstick; it forms red, moss-like patches, and the individual plants are often less than one centimetre in length.

General Remarks.—It will be seen that the "mallees" and the smaller shrubs, which really constitute the Whipstick, form an association of xerophilous plants, nearly all of which show special adaptation to the prevailing conditions. Some plants, it may be noted, here assume a more stunted form, adapted to the more trying situation in which they find themselves. *Grevillea lanigera* and *Correa speciosa* may be mentioned as examples.

It would hardly be expected that water-loving plants should venture far into the Whipstick. The few listed here owe their presence to a reservoir in the bush north of Eaglehawk, and the races which run to and from it. Hence the presence of *Juncaceæ*, *Goodenia gracilis*, and a few more such plants.

The gullies, especially where they broaden out on the fringes of the Whipstick, are favoured by a number of plants not usually found in the interior. Amongst shrubs may be mentioned *Acacia brachybotrys* (in the north), *A. sclerophylla*,

A. leprosa, *Dodonaea viscosa*, *Solanum simile*, *Olearia decurrens*, and *Myoporum platycarpum*; and, amongst herbaceous plants, *Ranunculus parviflorus*, *R. lappaceus*, *Pelargonium Rodnecynum*, *Calotis cuneifolia*, *Helichrysum incidum*, var. *angustifolium*, and *H. semipapposum*, var. *brevifolium*.

Subdivisions of Whipstick.—The composition of the Whipstick, as will be gathered from the above summary, is by no means uniform in different localities. At least three well-marked subdivisions can be defined—(1) the Central Whipstick, including its eastward prolongation; (2) the Western Whipstick, comprising the country between Eaglehawk and Neilborough; (3) the Northern fringe. The first is the typical subdivision, the others showing an admixture of forms from adjoining "formations."

As compared with the central portion, the western Whipstick presents several distinctive features. For instance, the "Whipstick" of the west is almost pure *E. viridis*, patches of *E. polybractea* and *E. Behriana* being found only rarely. Also, in many places, especially near Eaglehawk, the "mallee" occurs only as "islands" in a forest of arborescent eucalypts. Contrast this with the continuous mixed scrub of the central Whipstick. There is also in the western area an admixture of species from the ordinary Bendigo flora which do not occur in the central region—plants like *Acacia acinacea*, *Eriostemon obovalis*, *Cheiranthera linearis*, and *Tetradymia ciliata*. On the other hand, "central" plants such as *Pseudanthus ovalifolius*, *Prostanthera aspalathoides*, *Acacia obliqua*, *A. lineata*, *Eriostemon difformis*, *Helichrysum adnatum*, *Olearia decurrens*, *Westringia rigida*, var. *greenii*, and *Myoporum platycarpum* are absent from the west. The species confined to each subdivision, and those common to all, are indicated in the appended list. The boundary between the western and central Whipstick is represented approximately by the track marked II. on the map. On this track plants of both regions are found. For example, *Eriostemon obovalis* and *E. difformis* both occur here, whilst farther east the former species completely disappears.

The northern fringe is not so easily defined, although in the field the transition from the central scrub is easily observed. The principal feature of this section is the dominance of *Eucalyptus incrassata*. This occurs only in the portion which "bulges" northward towards Kamarooka. On the tracks IV., V., and VI., where it is most conspicuous, the fringe may be fully a mile through. Approached from the south, this scrub of "Giant Mallee" and other species is at first very dense, and as one proceeds the plants become taller, *E. incrassata* especially reaching almost the dignity of a tree. Finally, on the northern edge, the bush becomes open and

somewhat park-like, with occasional patches of *E. Bihriana* or *E. incrassata* eight metres or more in height, mixed with *L. hemiphloia* and *E. lanceolylon*. In this open part appear several species which are not found elsewhere in the district, notably *Fusanus acuminatus*, *Pittosporum phillyraeoides*, *Melaleuca parviflora*, *Pomaderris racemosa*, *Stenopetalum lineare*, *Calocephalus Sonderi*, and *Mesembreanthemum acnoides*: also some plants, such as *Clematis microphylla* and *Stuckhousia linearifolia*, which are not found elsewhere in the Whipstick. This is probably the transition to a new flora—that of the plains; but owing to its distance from Bendigo, and the fact that the country farther north is largely cultivated, and so has lost much of its original vegetation, I have been unable to investigate this fully. We have been wont to call the most promising part of this region the "Mystery Paddock," since, like Africa, it always yielded "something new."

Gregarious Species.—I shall not further tax your patience by attempting to describe in detail any of the local sub-associations of plants. A notable feature of the Whipstick is the gregarious nature of many species. Such remarkable plants as *Phebalium obcordatum*, *Cryptandra amara*, and *Acacia lineata* are found in large numbers in one limited area, and apparently nowhere else in the formation. The approximate position of these "patches" is indicated on the map. On the other hand, gregarious plants like *Baeckea ramosissima*, *Acacia hakeoides*, and *Boronia anomonifolia* are well distributed in many places.

"*The Whipstick Beautiful*."—The Whipstick, indeed, is a land of delightful surprises. Who would expect to find *Astrorhiza ledifolia* there, or *Crowea*, or *Pomaderris racemosa*, or *Logania floribunda*? Sometimes a tract of uninteresting country, with little but "mallee" to look at, will open suddenly into a very garden of delight. Such is the locality near Myer's Flat,* where, amongst a host of beautiful things, *Boronia anomonifolia* and *Cryptandra amara* are "bright particular stars." Then there is Flagstaff Hill,† the special glory of which is *Phebalium obcordatum*, and "Westringia Ridge,"‡ where the beautiful *Westringia rigida*, var. *grevillina*, and the shy, sweet-scented *Logania floribunda* lurk, and where the blue of *Dampiera luteola*, the scarlet of *Prostanthera aspalathoides*, and the gold of *Loudonia* are mingled; and there are places on the Kamarooka road where the purple *Prostanthera hirtula* vies with the scarlet *Prostanthera aspalathoides*, and where humble brown Daviesias and golden *Loudonia*, rosy *Baeckea* and snowy *Olearia*, pale *Pseudanthus* and pink *Boronia*.

* *Vide "Excursion to Bendigo"* (*Vic. Nat.*, xxxvi., p. 102).

† *Vide Vic. Nat.*, xxxviii., p. 87.

‡ *Vide Vic. Nat.*, xxxvii., p. 95.

Calythrix, and *Micromyrtus*, red *Grevillea* and blue *Dampiera*, and stately *Eriostemon*, compete to delight the eye.

This is the many-hued garment wherewith September and October rejoice the "wilderness and the solitary place," and which November faintly imitates, adding to its fading colours her own *Melaleucas* and *Pultenæas* and *Everlastings*. Yet more gorgeous is August's golden raiment—the gold of *Acacia pycnantha*, *A. hakeoides*, *A. aspera*, *A. leprosa*, and others. The Golden Wattle needs no praise, as it lights up these green solitudes with early sunshine; yet not it, but *A. hakeoides*, is the Acacia of the Whipstick. It occurs in two distinct forms, the commoner (to which these remarks apply) having very narrow phyllodes, whilst the rarer form has broader phyllodes and larger flower-heads, resembling the narrow-leaved form of *A. pycnantha*. A bush of this species in full bloom—a mound of pure gold—is a wonderful sight. To see acres of plants at once in the full blaze of their glory is a wonder that can hardly be described; yet it may be seen at many places in the Whipstick in the last days of August. By mid-September their brief glory is over. "He hath made everything beautiful in his time."

These are specially months of flowers, but at other times, in its everyday garb of green, the Whipstick has attractions. There are no empty months in its calendar. December, with *Melaleuca uncinata* and *Myoporum platycarpum*; January, with *Acacia retinodes*, *Choretrum glomeratum*, and the lovely *Melaleuca parviflora*; and February, with *Fusinus acuminatus*, *Olearia decurrens*, and *Cassinia aculeata*, have made it worth while to venture out in the heat of midsummer. Then there are the "Mallees" themselves, which flower with some irregularity from January to June. Even in the dull autumn and winter months we have *Leptomeria aphylla*, *Acacia diffusa*, *Olearia floribunda*, *Astrolobia humifusum*, *Hakea rugosa*, and *Acacia lineata*, each with its own interest and beauty.

Orchids.—Something may here be said about orchids, which have hardly been mentioned so far. They do not seem to play a great part in the economy of the Whipstick. Twenty-two species are listed, but some of these are seldom found, while some are only found near the border. The following may be mentioned as being comparatively common:—*Thelymitra aristata* and *T. antennifera*, *Pterostylis nana*, *P. parviflora*, *P. cyanocephala*, *Caladenia testacea*, *C. angustata*, *C. cærulea*, and *C. carneæ*, and *Glossodia major*. *Calochilus campestris* is included on the authority of C. French, sen.* I have not collected this species, though *C. Robertsoni* is sometimes found.

* "Orchids of Victoria" (Vic. Nat., 3., p. 56).

REFERENCES TO MAP OF WHIPSTICK SCRUB.

ABBREVIATIONS FOR "MALLEE EUCALYPTS":—

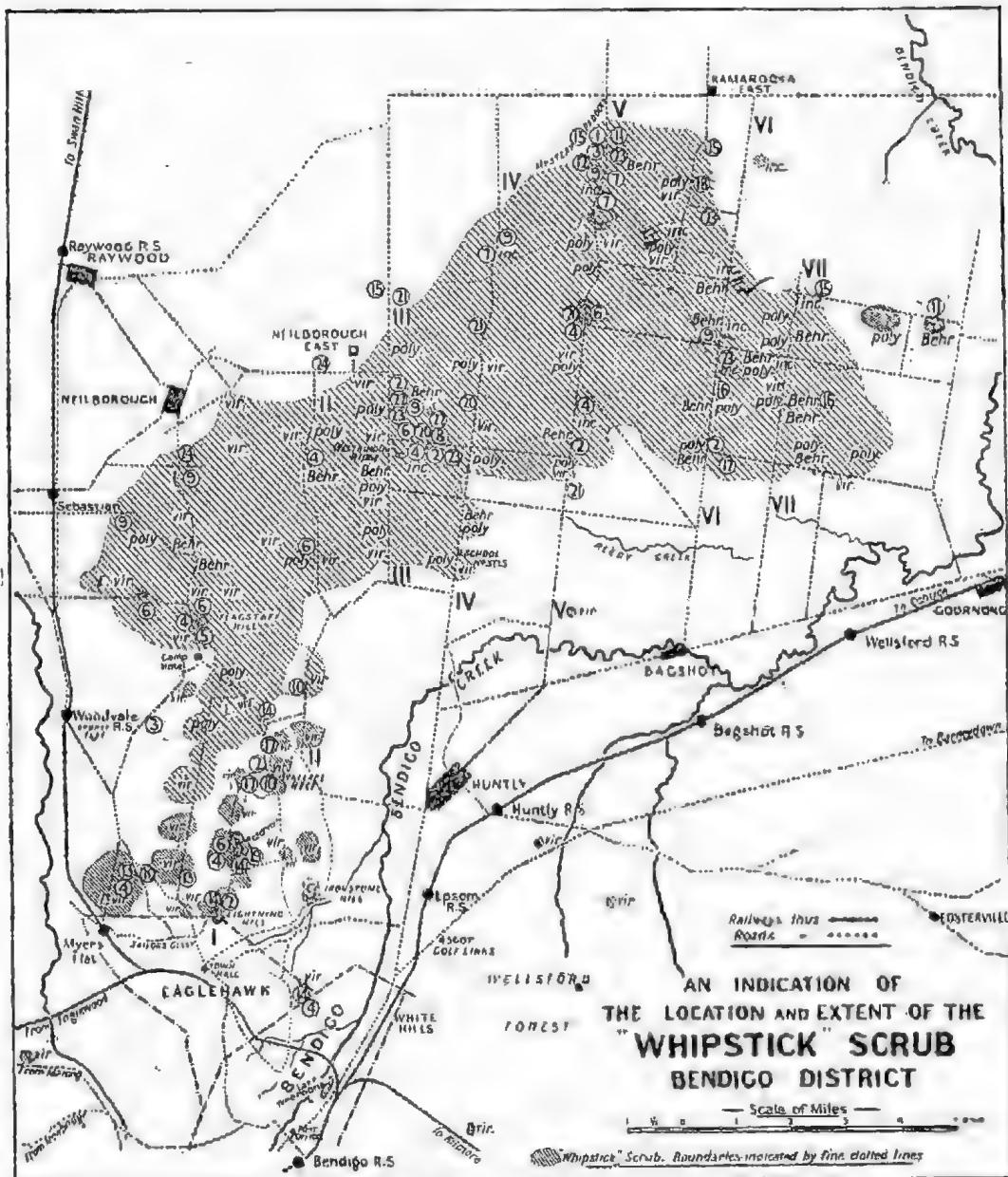
Viridis or Vir = Green Mallee.
 Poly (= Polybractea) = Blue Mallee.
 Behr (= Behriana) = Bull Mallee.
 Inc. (= Incrassata) = Giant Mallee.

OTHER PLANTS OF "WHIPSTICK" ASSOCIATION:—

1. *Stenopetalum lineare.*
2. *Billardiera cymosa.*
3. *Pittosporum phillyraeoides.*
4. *Boronia anemonifolia.*
5. *Phebalium obcordatum.*
6. *Crowea exalata.*
7. *Mesembryanthemum acutifoliale.*
8. *Acacia lineata.*
9. *A. brachybotrya.*
10. *A. hakeoides.*
11. *Melaleuca parviflora.*
12. *Pomaderris racemosa.*
13. *Cryptandra amara.*
14. *Astrotricha ledifolia.*
15. *Fusanus acuminata.*
16. *Choretrum glomeratum.*
17. *Grevillea rosmarinifolia.*
18. *Calocephalus sonderi.*
19. *Goodenia gracilis.*
20. *Logania floribunda.*
21. *Solanum simile.*
22. *Wostringia rigida* (var. *grevilleana*).
23. *Myoporum platycarpum.*
24. *M. deserti.*

Plants not listed above are generally of fairly wide distribution.

PLATE XV.



Contrast of Whipstick with Bendigo Flora.—Some statistics may render more evident the contrast between the flora of the Whipstick and the ordinary "Bendigo" type, as seen to the south and east of the city. Of the 227 species and varieties listed for the Whipstick, 40 are not found at all in the Bendigo bush, while 24 more, though common in the Whipstick, occur only rarely or in isolated patches outside its bounds. About 105 species which seem equally well distributed in both districts may be regarded as common, whilst the remaining 58 occur only rarely in the Whipstick, and are probably, in most cases, invaders from without, especially as they are usually seen near its boundaries. When it is mentioned that over 130 species of the richer "Bendigo" flora do not enter the Whipstick at all, the contrast is made still more remarkable.

Some interesting comparisons may be made in the representation of the principal families. Taking the principal oil-producing families, we find them very well represented in the Whipstick. Thus, Rutaceæ has six Whipstick species, representing 2.6 per cent. of the flora, while "Bendigo" has only three (1 per cent.); Myrtaceæ, excluding *Eucalyptus*, has eight Whipstick forms (3.5 per cent.) and eight "Bendigo" forms (2.5 per cent.); *Eucalyptus* has eleven Whipstick and ten "Bendigo" species (4.8 per cent. and 3 per cent. respectively); Labiateæ has four Whipstick and four "Bendigo" representatives (1.75 per cent. and 1.25 per cent.). Thus, about one-eighth of the Whipstick plants are oil-bearing, against one-thirteenth of the "Bendigo" plants. Were the count of individuals per acre instead of species, the result would be much more in favour of the Whipstick, where the oil-bearing forms are very common.

On the other hand, the Whipstick is very deficient in Papilionatae, having only eight representatives of five genera (3.5 per cent.) against twenty-three representatives of sixteen genera (7.2 per cent.) in the "Bendigo" scrub. Acacias are pretty evenly balanced—twelve Whipstick (5.3 per cent.) and seventeen "Bendigo" (5.3 per cent.) species. The constituent species, however, differ greatly; there are, for example, no Bipinnatae in the Whipstick.

Composites, especially the shrubby ones, are very well represented, thirty-six species and varieties (15.8 per cent.) being found, as compared with forty-one (12.8 per cent.) in the richer Bendigo flora. Orchids make a poor showing—twenty-two species (9.7 per cent.), compared with forty-five from the "Bendigo" formation (14 per cent.). Liliaceæ are evenly balanced, comprising about 4 per cent. of each flora. The Epacrids are common to both divisions, except that *Leucopogon virgatus* does not seem to occur in the Whipstick.

Other notable families well represented are Pittosporaceæ,

Santalaceæ, and Goodeniaceæ, whilst Proteaceæ, Chenopodiaceæ, Cyperaceæ, and Gramineæ are poorly represented. Ferns are practically absent from the Whipstick, though a stunted form of *Cheilanthes tenuifolia* is occasionally found in gravelly patches near the southern boundary. The "Bendigo" flora has seven species of ferns.

Former Extent of Whipstick.—In concluding an attempt to describe the Whipstick as it is, one may perhaps be pardoned for indulging some speculations as to its past. It seems certain that the "formation" had once a much greater extent. The great similarity in the composition of the Whipstick and the Inglewood "mallee," which has been already suggested, is remarkable in view of the fact that 18 miles intervene between the nearest points of the two scrubs—eighteen miles of plain country, and the Loddon valley, with its basalt flows. Again, in the Rushworth district, some 30 miles to the east of the Whipstick, we have a similar though smaller area, in which *Eucalyptus viridis*, *E. polybractea*, and *E. Behriana* are found. Somehow the idea emerges of an association of shrubby eucalypts resembling the "mallee," and, with their attendant undergrowth, extending over a large area of northern Victoria. The Whipstick and the other areas I have named seem to be but surviving fragments—islands, as it were, in a sea of more recent plant forms. The fragment of "mallee" vegetation at Werribee Gorge, though far from our present purpose, is suggestive of a probable former extension of that type far beyond its present limits.

Within the Bendigo district itself evidences that the Whipstick had once a much greater extent are not wanting. Isolated clumps of *Eucalyptus viridis* occur at distances of several miles from the present boundaries of the "formation." The approximate position of some which I have noted is indicated on the map; no doubt others have escaped notice. It will be seen that these patches occur as far south as the Marong road, to the west of the city, and the Heathcote railway to the east. Moreover, many localities in the intervening spaces show some characters of "Whipstick," though the "mallies" are not actually present. This applies to much of the country between the city boundary and Ironstone Hill.* Some of the vegetation on the Fosterville road suggests the same idea, species such as *Acacia hakeoides*, *A. sclerophylla*, *Londonia Behrii*, *Westringia rigida*, and the like occurring in quantity. *Melaleuca Wilsonii* occurs in the Wellsford Forest, as well as some clumps of "Green Mallee."

Even in the heart of the "Bendigo" formation one finds

* *Vide "Excursion to Bendigo" (Vic. Nat. xxix, p. 84).*

what look like survivals—*Acacia hakeoides* near Strathfieldsaye, *Londonia Behrii* in several places (one quite near to Big Hill), two or more patches of *Baeckea ramosissima*, and a large isolated patch of *Boronia anemonifolia* near Diamond Hill.

In the country immediately north of Eaglehawk the process of replacement appears to be now in progress. Here occur numerous "islands" of *Eucalyptus viridis*, with or without the usual Whipstick undergrowth. Some of these "islands" have an area of hundreds of acres, others consist of a few clumps only. Between the "islands" we find arborescent eucalypts of the species usually found in the Bendigo bush, whilst the undergrowth contains many "Bendigo" forms which do not occur in the Whipstick proper. It is generally, though not always, on rocky hillsides that the "mallees" have survived, whilst the invaders creep up the gullies between. Such a hill, crowned with graceful, waving tufts of "Green Mallee," is suggestive of a fortress, where an ancient race makes its final stand against the invader who has captured the valley below.

However that may be, the Whipstick yet remains to us a land somewhat weird and mysterious—the "Ultima Thule" of childish imaginings, the happy hunting ground of maturer years. As far as human interference goes, it is likely to survive longer than many another Victorian plant association. Its sterility, which has been its salvation in the past, will probably long permit its hardy plants to retain possession of the uninviting home they have chosen.

I have been greatly indebted to the National Herbarium authorities for the determination of many of the more unusual plants here mentioned. My thankful acknowledgments are also due to several members of the Club—especially to Mr. C. Daley and Dr. Sutton—for many kindly hints and suggestions and much information. Mr. A. D. Hardy has been so good as to re-draw my map for publication.

The following list of Whipstick plants does not claim absolute completeness. The sequence of families and the nomenclature of genera and species is that of the "Census" recently published. Flowering times are shown. The letters *c*, *w*, and *n* represent the central, western, and northern sections as defined above. The symbol * indicates that the plant is found in the Whipstick, but not in the "Bendigo" formation; † indicates a Whipstick plant occasionally found in "Bendigo" bush; ‡ a plant equally common in both areas; and § a "Bendigo" plant only occasionally found in the Whipstick:—

POLYPODIACEAE—

Asplenium trichomanes (Linn.) Sw.

GRAMINEAE.—

cwn *Themeda triandra*, Forst. (Nov.)
cwn *Stipa pubescens*, R. Br. (Oct., Nov.)
cwn *S. setacea*, R. Br. (Oct., Nov.)
 n § *Calamagrostis filiformis* (Forst.), Pilger (Nov.)
cwn *Danthonia penicillata*, F. v. M. (Nov.)
 w † *D. penicillata*, var. *pallida*, F. v. M. (Nov.)
 w § *Cynodon Dactylon*, Rich. (Dec.-Feb.)
 w § *Eragrostis Brownii*, Nees. (Dec.-Mar.)
 n § *Poa cespitosa*, G. Forst. (Oct., Nov.)

CYPERACEAE.—

w § *Cyperus Eragrostis*, Vahl. (Mar.-May),
cwn *Lepidosperma laterale*, R. Br. (Dec.-May),
wn *Carex appressa*, R. Br. (Oct., Nov.)

CENTROLEPIDACEAE.—

w † *Centrolepis strigosa* (R. Br.), Roem. and Sch. (Oct.)

JUNCACEAE.—

w § *Juncus polyanthemos*, Buch. (Sept., Oct.)
cwn *J. pauciflorus*, R. Br. (Sept.-Nov.)
 § *J. prismatocarpus*, Bth. (Nov.-Mar.)

LIJACAE.—

w § *Burchardia umbellata*, R. Br. (Oct., Nov.)
cw § *Anguillaria dioica*, R. Br. (Aug., Sept.)
 w § *Bulbine bulbosa*, Haw. (Oct.)
cwn *Thysanotus Patersoni*, R. Br. (Oct.)
 w § *Dichopogon strictus* (R. Br.), J. G. Baker (Oct., Nov.)
cw § *Arthropodium minus*, R. Br. (Oct., Nov.)
cwn *Dianella revoluta*, R. Br. (Oct., Nov.)
cw † *Lomandra multiflora* (R. Br.), Britten (Sept., Oct.)
cw † *L. filiformis* (Thunb.), Britten (Sept., Oct.)

AMARYLLIDACEAE.—

cwn § *Hypoxis glabella*, R. Br. (Aug.-Oct.)

ORCHIDACEAE.—

cwn † *Prasophyllum nigricans*, R. Br. (Mar., April).
 ?w † *Calochilus campestris*, R. Br.
 w † *C. Robertsonii*, Bth. (Oct.)
cw † *Thelymitra aristata*, Lindl. (Oct.)
cw † *T. antennifera*, Hook f. (Oct.)
cw § *T. longifolia*, R. & G. Forst. (Oct.)
 w † *Microtis portifolia*, R. Br. (Oct., Nov.)
 w § *Eriochilus autumnalis*, R. Br. (April, May).
cw † *Caladenia angustata*, Fitz. (Oct.)
cw † *C. coerulea*, R. Br. (Aug., Sept.)
cw † *C. carneae*, R. Br. (Sept.)
cw † *Caladenia testacea*, R. Br. (Sept., Oct.)
cw † *Glossodia major*, R. Br. (Sept., Oct.)
cw § *Diuris maculata*, Sm. (Aug., Sept.)
 w § *D. sulphurea*, R. Br. (Oct.)
 n § *Pterostylis alata* (Labill.), Reich. (June, July).
cw † *P. cycnocephala*, Fitz. (Aug.-Oct.)
 w † *P. mutica*, R. Br. (Oct.)
cwn † *P. nana*, R. Br. (Aug., Sept.)
cw † *P. parviflora*, R. Br. (April, May).
 w § *P. rufa*, R. Br. (Nov.)
wn § *P. reflexa*, R. Br. (April-June).

CASUARINACEAE—

cwn† *Casuarina lepidophloia*, F. v. M. (July–Sept.)
cwn† *C. distyla*, Vent. (May–Oct.)

PROTEACEAE—

w§ *Persoonia rigida*, R. Br. (Dec.)
cw† *Grevillea lanigera*, A. Cunn. (Aug.–Nov.)
cw† *G. rosmarinifolia*, A. Cunn. (Aug., Sept.)
cw† *Hakea rugosa*, R. Br. (May–Aug.)

SANTALACEAE—

cwn† *Exocarpus cupressiformis*, Labill. (Jan.–July).
w† *E. stricta*, R. Br. (Sept., Oct.)
n† *Fusanus acuminatus*, R. Br. (Jan., Feb.)
*c** *Chorétrum glomeratum*, R. Br. (Jan., Feb.)
cw† *Leptomeria aphylla*, R. Br. (Feb.–June).

CHENOPodiACEAE—

n† *Rhagodia nutans*, R. Br. (Dec., Jan.)
*cn** *R. hastata*, R. Br. (Nov.–Jan.)
cn† *Atriplex semibaccatum*, R. Br. (Nov., Dec.)

AIZOACEAE—

*n** *Mesembrianthenium aequilaterale*, Haw. (Sept., Oct.)

PORTULACACEAE—

cw† *Calandrinia calyprata*, Hk. f. (Sept.)
*c**C. pygmaea**, F. v. M. (Sept.)

CARYOPHYLLACEAE—

*w** *Sagina apetala*, L. (Oct.).

RANUNCULACEAE—

n† *Clematis microphylla*, DC. (Aug., Sept.)
cwn§ *Ranunculus lappaceus*, Sm. (Aug.–Oct.)
cw† *R. parviflorus*, L. (Sept., Oct.)

LAURACEAE—

cw† *Cassytha glabella*, R. Br. (Dec., Jan.)
cwn† *C. melantha*, R. Br. (Sept., Oct.)

CRUCIFERAE—

*n** *Stenopetalum lincare*, R. Br. (Oct.)
*n** *Lepidium hyssopifolium*, Desv. (Oct.)

DROSERACEAE—

w† *Drosera glanduligera*, Lehm. (Sept., Oct.)
cwn† *D. auriculata*, Backh. (Sept.)
w§ *D. peltata*, Sm. (Sept., Oct.)
cw† *D. Menziesii*, R. Br. (Aug., Sept.)

CRASSULACEAE—

cw† *Crassula Sieberiana* (Sch.), Ostenf. (Sept.)
cw† *C. macrantha* (Hk. f.), Diels & Pritz (Oct.)

PITOSPORACEAE—

*n** *Pittosporum phillyraeoides*, DC. (Oct., Nov.)
cw† *Marianthus procumbens*, Bth. (Sept., Oct.)
cwn† *Bursaria spinosa*, Cav. (Nov.–Jan.)
*cwn** *Billardiera cymosa*, F. v. M. (Oct., Nov.)
w§ *Chiranthera linearis*, A. Cunn. (Nov.)

ROSACEAE—

w§ *Acæna ovina*, A. Cunn. (Oct., Nov.)

LEGUMINOSAE—

w† *Acacia aspera*, Lindl. (Aug., Sept.)
w† *A. acinacæ*, Lindl. (Sept., Oct.)

LEGUMINOSAE—continued.

*cwn** *A. brachybotrya*, Bth. (Oct.)
cw†A. diffusa, Edwards (Mar.–Sept.)
cwn†A. hakeoides, A. Cunn. (Aug., Sept.)
*c*A. lineata*, A. Cunn. (June, July).
cw†A. leprosa, Sieb. (Aug., Sept.)
*cn*A. obliqua*, A. Cunn. (Sept., Oct.)
cwn†A. pycnantha, Bth. (July–Sept.)
cwn†A. retinodes, Schlech. (Jan., Feb.)
cwn†A. sclerophylla, Lindl. (Aug., Sept.)
cw†A. vomeriformis, A. Cunn. (July–Sept.)
cw§Daviesia corymbosa, Sm. (Sept., Oct.)
cwn†D. ulicina, Sm. (Aug.–Oct.)
cwn†D. genistifolia, A. Cunn. (Sept., Oct.)
cw†Pultenaea largiflora, F. v. M. (Nov., Dec.)
cw†P. pedunculata, Hk. (Sept., Oct.)
cw†Eutaxia empetrifolia, Schlech. (Sept., Oct.)
cw†Dillwynia ericifolia, Sm. (Oct., Nov.)
w§Kennedya prostrata, R. Br. (Sept., Oct.)

GERANIACEAE—

w§Geranium dissectum, L. (Aug.–Oct.)
w§Pelargonium Rodwayanum, Lindl. (Nov.–Jan.)

OXALIDACEAE—

cwn†Oxalis corniculata, L. (Sept., Oct.)

RUTACEAE—

cw†Boronia anemonifolia, A. Cunn. (Aug.–Oct.)
w†Eriostemon obovalis, A. Cunn. (Aug.–Oct.)
*cw*E. distortus*, A. Cunn. (Sept.–Nov.)
*w*Phebalium obcordatum*, A. Cunn. (Aug., Sept.)
*cw*Crowea exalata*, F. v. M. (Oct.–Dec.)
cwn†Correa speciosa, Andr. var. *normalis* (June–Aug.)

TREMARANDRACEAE—

w§Tetrapetra ciliata, Lindl. (Aug.–Oct.)

EUPHORETIACEAE—

*c*Pseudanthus ovalifolius*, F. v. M. (Aug.–Oct.)

STACKHOUSIACEAE—

ns§Stackhousia linearifolia, A. Cunn. (Oct.)

SAPINDACEAE—

cn§Dodonaea viscosa, Jacq. (Mar.–July).

RHAMNACEAE—

*n*Pomaderris racemosa*, Hk. (Oct.)

w†Cryptandra amara, Sm. (Aug., Sept.)

DILLENIACEAE—

w†Hibbertia densiflora, F. v. M. (Sept.–Nov.)

cw†H. stricta, R. Br. (Sept.–Nov.)

cw†H. acicularis, F. v. M. (Sept., Oct.)

GUTTIFERAE—

w§Hypericum japonicum, Thunb. (Oct.–Dec.)

VIOLACEAE—

cw†Hybanthus floribundus, F. v. M. (July–Sept.)

THYMELAEAE—

cwn§Pimelea spathulata, Labill. (June–Oct.)

LYTHRACEAE—

w§Lythrum hyssopifolia, L. (Nov.–Jan.)

MYRTACEAE—

*cwn*Eucalyptus Behriana*, F. v. M. (Jan.–April).

cwn†E. hemiphloia, F. v. M. (Jan.–June).

*cn*E. incrassata*, Labill. (Mar.–May).

MYRTACEAE—*continued.*

cum†E. leucoxylon, F. v. M. (Mar.-Nov.)
w§E. macrorhyncha, F. v. M. (Jan.)
w§E. melliodora, A. Cunn. (Nov.-Jan.)
*n*E. odorata*, Behr. (?) (July).
*cum*E. polybractea*, R. T. B. (May-Aug.)
cum†E. polyanthemos, Schlech. (Sept., Oct.)
cum†E. sideroxyylon (Wools), A. Cunn. (April-Sept.)
*cum*E. viridis*, R. T. B. (Dec.-Feb.)
cum†Leptospermum myrsinoides, Schlech. (Sept., Oct.)
*n*Metaleuca parviflora*, Lindl. (Jan.)
cum†M. uncinata, R. Br. (Nov., Dec.)
cum†M. decussata, R. Br. (Oct.-Dec.)
cum†M. Wilsonii, R. Br. (Oct., Nov.)
cum†Baeckea ramosissima, A. Cunn. (Sept., Oct.)
cum†Calythrix tetragona, Labill. (Oct., Nov.)
*cum*Micromyrtus ciliatus* (Sm.), J. M. Black (Sept., Oct.)

GENOTHERACEAE—

w§Epilobium junceum, G. Forst. (Nov., Dec.)

HALORRHAGIDACEAE—

cum†Loudonii Behrii, Schlech. (Oct., Nov.)
w†Halorrhagis elata, A. Cunn. (Nov.)
cum†H. teucrioides, P. DC. (Oct., Nov.)

ARALIACEAE—

w†Astrotricha ledifolia, DC. (Sept., Oct.)

UMBELLIFERAE—

cum†Hydrocotyle laxiflora, DC. (Nov.)
cum†H. capillaris, F. v. M. (Oct.)
w§H. asiatica, L. (Jan.)
w§Eryngium rostratum, Cav. (Nov., Dec.)
cum†Daucus brachiatius, Sieb. (Sept., Oct.)

ERACERIDACEAE—

cum†Astroloma humifusum, R. Br. (Mar.-July).
cum†Melichrus urceolatus, R. Br. (June-Aug.)
cum§Lissanthe strigosa, R. Br. (Aug., Sept.)
cum†Leucopogon rufus, Lindl. (Dec.-May).
w†Acrotrichis serrulata, R. Br. (Aug.)
cum†Brachyloma daphnoides, Bth. (Oct., Nov.)

LOGANIACEAE—

*c*Logania floribunda*, R. Br. (Sept.)

GENTIANACEAE—

cum†Sebaea ovata, R. Br. (Sept., Oct.)
w§Erythraea australis, R. Br. (Nov.-Feb.)

LABIATEAE—

cum†Prostanthera hirtula, F. v. M. (Sept., Oct.)
cum†P. aspalathoides, A. Cunn. (Sept., Oct.)
cum†Westringia rigida, R. Br. (Sept., Oct.)
*c*W. rigida*, R. Br., var. *Grevillina* (Sept., Oct.)

SOLANACEAE—

*cum*Solanum simile*, F. v. M. (Sept., Oct.)

SCROPHULARIACEAE—

cum†Veronica calycina, R. Br. (Sept., Oct.)

MYOPORACEAE—

*cum*Myoporum deserti*, A. Cunn. (Aug.)

w†M. Dampieri, A. Cunn.

*cum*M. platycarpum*, R. Br. (Nov., Dec.)

PLANTAGINACEAE—

wn§Plantago varia, R. Br. (Oct., Nov.)

RUBIACEAE—

wn *§Galium australe*, DC. (Sept., Oct.)
n *§Asperula scoparia*, Hk. f. (Sept., Oct.)

CAMpanulACEAE—

c *Lobelia gibbosa*, Labill. (Dec., Jan.)
w *§Wahlenbergia gracilis*, A. D. C. (Oct., Nov., April, May).

GOODENIACEAE—

cwn *†Goodenia varia*, R. Br. (Oct.-Dec., Jan.-June).
cwn *†G. geniculata*, R. Br. (Sept.-Nov.)
cwn **G. amplexans*, F. v. M. (Oct.-Dec., May, June).
w *§G. elongata*, Labill. (Oct., Nov.)
w *§G. pinnatifida*, Schlech. (Oct.)
w **G. gracilis*, R. Br. (Dec.-Mar.)
cw *†Dampiera lanceolata*, A. Cunn. (Sept.-Nov.)

BRUNONIACEAE—

w *§Brunonia australis*, Sm. (Oct., Nov.)

STYLIIDIACEAE—

w *†Stylium graminifolium*, Swartz (Oct., Nov.)
w *†S. despectum*, F. v. M. (Sept., Oct.)
cw *†Levenhookia dubia*, Sond. (Sept., Oct.)

COMPOSITAE—

cn **Olearia decurrens*, Bth. (Jan., Feb.)
c **O. floribunda*, Bth. (Mar.)
w *†O. microphylla*, Vent. (Sept., Oct.)
w *§O. ramulosa*, Bth. (Oct., Nov.)
cw *†O. teretifolia*, F. v. M. (Aug.-Oct.)
wn *†Vittadinia australis*, A. Rich. (Oct., Nov.)
cn **Calotis cuneifolia*, R. Br. (Aug.)
n *§Lagenophora Billardieri*, Cass. (Oct.)
cwn *†Brachycome collina*, Bth. (Sept.)
cn **B. exilis*, Sond. (Oct.)
cn *†B. multifida*, DC. (Oct.)
cw *†Cotula coronopifolia*, L. (Sept.-Nov.)
w *§Centipeda Cunninghamii*, F. v. M. (Dec.-Feb.)
w *†Myrioccephalus rhizocephalus*, Bth. (Oct.)
n **Calocephalus Sonderi*, F. v. M. (Oct., Nov.)
cw *§Craspedia Richea*, Cass. (Aug., Sept.)
cw *†Cassinia aculeata*, R. Br. (affin. var. *uncata*, Bth.) (Jan.-April).
cwn *†C. arcuata*, R. Br. (Mar.-May).
w *§Humera ozothamnoides*, F. v. M. (Nov., Dec.)
cw *†Rutidosis Pumilo*, Bth. (Oct.)
cw *†Millotia tenuifolia*, Cass. (Sept.)
wn *§Podolepis acuminata*, R. Br. (Oct., Nov.)
w *†Leptorthynchus squamatus*, Less. (Oct., Nov.)
w *†L. tetrachætus* (Schl.), J. M. Black (Dec.)
cn **Helichrysum adnatum*, Bth. (Nov., Dec.)
wn *§H. apiculatum*, DC. (Oct., Nov.)
cw *†H. lucidum*, Henck. (var. *angustifolium*) (Oct.-Dec.)
cwn *†H. obcordatum*, F. v. M. (Oct., Nov.)
wn *†H. semipapposum*, DC. (Sept.-Nov.)
cwn **H. semipapposum*, DC. (var. *brevisolium*, Sonder) (Jan.-April).

wn *†Helipteron corymbiflorum*, Schlech. (Oct.)

cwn *†H. australis* (Gray), Ostenf. (Sept., Oct.)

w *§Gnaphalium luteo-album*, L. (Nov.-Feb.)

wn *†Stuartiana Muellieri*, Sond. (Oct., Nov.)

cwn *†Erechtites quadridentata*, DC. (Sept.-April).

cw *†Microseris scapigera* (Forst.), Sch. Bip. (Sept., Oct.)

BIRD NOTES.

BIRDS IN A GARDEN AT LARDNER.—How many members who sought birds in the holidays have as good a list as I have, and all of them under observation from the verandah of our house? We have some strangers to the district. Firstly, the English Blackbird, *Turdus merula*, which built their nest in a Camellia bush not more than twenty feet from where we all congregate on the verandah on hot days for afternoon tea. There they reared three lots of young—two in the first, four in the second, and we are sure of one in the third; there may have been more, but we were so surprised to find them we frightened the young birds out of the nest. How shy the Blackbird is! And yet he is quite cheeky, and visits each door for scraps.

The Harmonious Thrush, *Colluricinclu harmonica*, has overcome his shyness, and will take his meals from my hand. There are several, and bounce me to "Get my dinner, quick," which call brings also the Sparrows, which are not at all shy or backward. Two trees grow within six feet of the diningroom door, and in one of them is the Goldfinch's nest, and the other is the Sparrow's choice. Another few yards away, in front of the Galah cage, hangs the Yellow-jumped Tit's nest, and twice that distance further out the beautifully-made nest of the Olive-backed Oriole, *Mimetes sagittata*, is woven on to the tree branch. This bird we found most interesting. One, or perhaps either, of the pair sat on a water-pipe outside the pantry window and whistled the common call of the Black-faced Cuckoo-Shrike the whole day; then we discovered it carrying a long piece of twine, which it lost, and to this day hangs in another tree. The young of this pair of Orioles left the nest yesterday, very young and still downy. One was not at all distressed when caught, and it was only quiet while held in one's hands. These birds are fruit-eating, but we forgave them the cherry robbery when we found they were so fond of the pretty caterpillar found so numerously on Virginian creeper, and which later turns into the day-flying black and white and gold moth, *Agarista glycina*.

We are out among the trees now, and Bell-birds—or, rather, Bell Miners—*Manorina melanocephala*, are so musical all day long. Even one of these shy birds found its way on to the verandah, to its surprise, and I hear four of them in the garden in the early morning. How we notice it once they cease their musical notes in the tops of the trees! And yet they come low down in the bushes in the evening.

Two old pioneers returned one morning—the large Black Cockatoo, *Calyptorhynchus funereus*. We have not seen or heard one here for some years. Gang Gangs, *Callocephalum galeatum*, appear when the berries are red on the rowan tree. They

were here a fortnight ago, in a messmate at the gate—eight of them, and seemed to recognize our harmlessness.

To-day, in the grassy part of the garden, in tall cocksfoot, I saw an Emu-Wren, *Stipiturus malachurus*, with its long cotton feathers in its tail, keeping them nice and smooth. I have not seen one for months; burning-off disturbs them so.

The Blue Wren, *Malurus cyanocephalus*, and his retinue come to the door for crumbs, and presently will congregate with Striated Tits and Fire-tailed Finches, and all will be one big flock. I have seen fourteen Firetails bathing in a kerosene tin which held a water-lily plant beneath the water. They used it as a bathing pool, and they paid far more attention to the objections of the Yellow-breasted Shrike-Robin than they did to mere humans who were about.

The Welcome Swallow reared four young under the verandah. Ungracious birds I found them. After spending some time one hot night shading the young from a light I had on the verandah, they awakened me next morning at daybreak, and for peace sake I left the verandah myself.

The Mountain Thrush has returned, and runs about finding his favourite worms easily this year, and calling anathema on his head when the gardener finds her sheltered seedlings all picked out by this bird in the search for worms; but the bird is a great favourite.

Three Boobook Owls (Mopokes) were disturbed in the orchard, and the Mudlarks, *Grallina pica*, gave them a bad time for the rest of the day.

The Black-and-White Fantail appears after a wet night, while the White-shafted Fantail is always on the west verandah during an east wind; and this year we add another Flycatcher to our list—the Satin Flycatcher. The Honey-eaters are very numerous. Our old friends the Spinebills are first. I have assisted them with their small family several times in wet weather, when the honey in the flowers is too wet for food, and have given a young Spinebill honey out of a spoon. They never seem to forget. There are always feuds amongst the different varieties. The Wattle-bird is big and noisy. The White-eared is very busy, and calling "Cherry Bob." The Tawny-crowned comes in from his Banksia patch in the bush, and another, small, brownish-grey with yellow feathers on and wings, is a new one here; we have not placed it yet.

Are you surprised that the Starling has not been recorded yet? He is not in the garden, but since the young have arrived they have gone to the crops, where the caterpillars are, and I must say that, though there were dozens a few weeks ago, they left the garden to the Parrots, who do so much mischief. Parrots, both Red Lory, *Aprosmictus cyanopygius*, and Rosellas, *Platycercus eximius*, work all the year. They

eat the buds. The flowers are put off, and when the fruit forms they pull the cherries off long before they are full grown.

As I write I can hear the young Sacred Kingsfisher. They also, like so many birds, use the fowls' drinking vessels. The old Kookaburra gets pushed back by the Magpies. We notice the Magpies have learnt to stay out late, and so get those numerous brown beetles that come to the gum-trees in the evenings.

With the Wood-Swallows on their return this season was the White-shouldered Caterpillar-eater. First time we have noted it on our place, and, although I have only mentioned the birds immediately in the garden and at the doors, I want to mention the English Skylark, which we hear occasionally. The Black-faced Cuckoo-Shrike, an occasional Little Brown Hawk, a Grey Heron (Blue Crane), and Quail finish my garden list, which, I think, is very satisfying to anyone who is really fond of birds in their own surroundings. These I can see any day and at any time of day, and surely it is a great pleasure.—C. C. CURRIE,
"Brandie Braes," Lardner, Gippsland, 4th January, 1924.

SOME ELTHAM BIRDS.—One interesting event this season is the unusual number of White-shouldered Caterpillar-eaters, *Lalage tricolor*, that we are favoured with this season; it is quite a record year for them. Every paddock and hillside is enlivened by the rich trilling of the male birds, and they are nesting freely in the trees here. One pair have built their small nest in the fork of a horizontal branch of a Red Box close to the house, the male bird doing most, if not all, of the building, and he was not at all concerned at me watching his operations. The nest was completed and two eggs laid within the week ("Cup Week," 4th to 10th November), the male bird doing a good share of the sitting. Their nesting habits are interesting. In the morning one bird sits for about ten or fifteen minutes, and the other comes and relieves. If the female bird is rather long away the male goes after her and drives her on to the nest, quite domineering. Of these I have been fortunate in securing several good negatives. They are not shy of the camera facing them at twenty-six inches from the nest.

Those fine warblers of the bush, the two Whistlers, the Rufous-breasted, *Pachycephala rufiventris*, and the Golden-breasted, *P. pectoralis*, are making the gullies ring with their notes, the rufous species being very numerous.

Of northern visitors, the Black-faced Cuckoo-Shrike, *Grauculus melanops*, four species of Cuckoos, and the Olive-backed Oriole, *Mimeles sagittata*, are fairly plentiful this spring.

There are not many Wood-Swallows this season in comparison with last year, which was a record one in this district.

It was a wonderful sight on Hospital Sunday (28th October) and on several other occasions during October and November of last year to see large flocks of them darting after and feasting on the Bogong moths, of which we had an invasion. There must have been millions of them flying about the box-trees, which were in heavy bloom. A great many of the other insect-eating birds were also despatching the moths. Some of the Wood-Swallows, of which there were three species—the White-browed, *Artamus superciliosus*, the Masked, *A. personatus*, and the Sordid, *A. tenebrosus*—settled down to nest in the district, but the bulk of them disappeared after thinning out the "Bogongs."

Another northern visitor that came here last spring in numbers was the Australian Roller or Dollar-bird, *Eurystomus pacificus*. I believe that they nested about the creek, as on several occasions I observed young birds with the adults, but I have not seen or heard a single specimen of the genus this season so far.

Several Black Ducks, *Anas superciliosa*, were observed about the creek during the drought period of this year.

Painted Quail, *Turnix varia*, are fairly numerous about here at present. Some of them become quite tame, and come within a few yards of our back verandah.

The Grey Thrush, *Colluricincla harmonica*, Bronze-winged Pigeon, *Phaps chalcoptera*, Tree-creepers, Nuthatches, Tit-Warblers, about twelve or more species of Honey-eaters, White-winged Choughs, *Corcorus melanorhamphus*, and most of the other local birds are all busy with nesting cares now, some of them being later than usual.

I found, one day this week, an egg of the Pallid Cuckoo, *Cuculus inornatus*, in the nest of a pair of Goldfinches—an unusual occurrence—in one of our apricot trees, which is a favourite place for the finches to build. This is the second time that the occurrence has come under my observation.—W. C. TONCE, Eltham, 15th November, 1923.

[These notes have been held over for want of space.—ED. *Vic. Nat.*]

Since sending last notes I have observed and identified several pairs of Painted Honey-eaters, *Entomophila picta*, which are mentioned in Leach's book as being very rare. I had often heard their distinctive notes before, but was not sure of the bird. One pair built their nest and reared two young birds in a hanging bough of a Red Box just a few yards from our back door, and they are still about the paddock. The nest was a very frail structure made of a few bent grasses over a couple of dead leaves, and from underneath it was hard to recognize as a nest. Unfortunately, I found the nest too late to obtain photographs of the birds.—W. C. TONCE, Eltham, 12th January, 1924.

The Victorian Naturalist.

VOL. XL.—No. 11.

MARCH 6, 1924.

No. 483.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday, 11th February, 1924.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about sixty members and visitors were present.

REPORTS.

A report of the visit to the Zoological Gardens on Saturday, 19th January, was given by the president, who said that the large party of members had been conducted round the Gardens by the Director, Mr. A. Wilkie, to whom they were indebted for a very interesting afternoon.

On the motion of Messrs. Barnard and Lambert, a vote of thanks was unanimously directed to be sent to Mr. Wilkie for his kindness in acting as leader of the party.

A report of the Foundation Day excursion to Warburton on Saturday-Monday, 26th-28th January, was given by the leader, Mr. L. Thorn, who said that, owing to almost incessant rain, little opportunity occurred for doing field work. During a short period of sunshine the flowers of the Sweet Bursaria, *B. spinosa*, which was in full bloom along the river-bank, were searched for beetles, with moderate success. On the Monday the weather was slightly better, and during a short walk up the road towards Mount Donna Buang an uncommon species of "emerald" moth was taken, apparently benumbed by cold, on the flower of a Leek Orchid, *Microtis porrifolia*. Altogether, the excursion was very disappointing so far as collecting was concerned.

A report of the excursion to Eltham on Saturday, 9th February, was given by Mr. F. G. A. Barnard, who acted as leader in the unavoidable absence of Mr. A. D. Hardy, the leader for the day. Mr. Barnard said that the afternoon had turned out very pleasant. A fair number of members were present. The route taken was to the south-east of the township, where several species of eucalypts and other shrubs and plants were noted, none of which were of particular interest.

ELECTION OF MEMBERS.

On a ballot being taken, Miss E. C. Cameron, 87 Powlett-street, East Melbourne; Miss E. M. Haynes, "Eckersley," Plant-street, Malvern; Miss I. Morrison, "Baringa," College-parade, Kew; and Mr. Thomas Meldrum, "Persoonia," 380 Northcote-road, Armadale, were duly elected ordinary members; and Mr. D. J. Maher, State-school, Newry, and Mr. John Elliott, Railway Station, Nunyee, country members of the Club.

GENERAL BUSINESS.

The Chairman said that Mr. F. E. Wilson had consented to act as librarian for the present.

PAPERS READ.

1. By Mr. F. E. Wilson, entitled "Some Glimpses of Our Bush Birds."

This took the form of an illustrated lecture, in which the author gave some interesting notes about many of our familiar native birds. Some fine pictures of the Lyre-bird at home were greatly appreciated.

Mr. G. A. Keartland and the chairman expressed their pleasure at the beauty of the slides exhibited and the very instructive nature of the remarks regarding them.

2. By Mr. H. B. Williamson, F.L.S., entitled "Description of a New Genus of the Family Epacridaceæ."

The author said that during the Club excursion to the Brisbane Ranges (from Bacchus Marsh) on the 10th November last, amongst other flowers, he picked some specimens which at first glance appeared to be the Common Beard-Heath, *Leucopogon (Styphelia) virgatus*, R. Br., but on closer examination he found that they did not agree with any described genus of the Epacridaceæ, and, after search at the National Herbarium, &c., he had come to the conclusion that a new genus should be founded for it. He had therefore determined to set up the genus *Choristemon* for it, and had chosen the specific name of *humilis*, having reference to its lowly habit.

Mr. C. Oke congratulated the author on his interesting find, and the Club on the fact that it would be given to the world through the pages of its journal, the *Victorian Naturalist*.

NATURAL HISTORY NOTES.

Mr. C. Oke gave an account of a combat he had recently seen between a Greenhead Ant, *Chalcoponera metallica*, and a small spiderling, which had resulted in the death of both combatants.

Mr. A. J. Tadgell referred to his exhibit of the Alpine Leek Orchid, *Prasophyllum Suttonii*, Rogers and Lees, first described from the Buffalo Plateau in 1912. The specimen exhibited, when collected on Mount Bogong on 2nd January, showed no sign of flower buds, the leaf sheath being unbroken, but on the 5th February the plant had budded, and developed twelve large, perfect flowers, true to colour—clear white, with pale purplish-red markings and stripes.

EXHIBITS.

By Mr. F. G. A. Barnard.—Flowers of two Wattles, *Acacia retinodes* and *A. pruinosa*, now blooming in his garden at Kew.

By Mrs. Coleman.—Flowers of the orchid *Spiranthes australis*, Lindley, Austral Lady's Tresses, from Healesville—normal

spikes showing the spiral inflorescence in a single row, and abnormal blooms showing (a) inflorescence in a double spiral arrangement, and (b) spiral arrangement not clear—flowers in three rows.

By Miss G. Nethercote.—Conglomerate from Mount Reed, West Coast of Tasmania; ore from Mount Lyell mine; pyrites from North Mount Lyell; slag from the smelters, and copper after leaving smelters, Mount Lyell, Tasmania.

By Geological Survey of Victoria, per Mr. A. E. Rodda.—Epiphysis of whale, found on beach near Darby River, National Park, Wilson's Promontory.

By Mr. A. E. Rodda.—Drone-fly and larvae.

By Mr. W. H. A. Roger.—Aboriginal implements found on Gol Gol station, about 100 miles north-west of Balranald, N.S.W., consisting of eleven stone axes, two oval pounding stones, and one flat grinding stone used for grinding nardoo seeds, &c. The latter were found in the vicinity of aboriginal camping grounds, near large swamps, in which the Nardoo plant grows plentifully. The dishes in which the seeds were pounded were originally flat slabs of sandstone, measuring about two feet in length by ten or eleven inches in width, with a thickness of three inches. The constant pounding had worn away the surface to a depth of half to an inch and a half, so that the stone resembled a shallow dish. The aborigines had died or left the district many years ago.

By Mr. J. Searle.—Some minute aquatic hymenopterous insects.

By Dr. C. Sutton.—Fresh flowers from Cradle Mountain, Tasmania, including *Blandfordia marginata*, *Milligania longifolia*, *M. Lindoni*, *Olearia longifolia*, *Archeria serpillifolia*, *Boronia citriodora*, *B. rhomboidea*, *Olearia obcordata*, *O. personata*, and *Belledenka montana*; with foliage of *Notofagus Cunninghamii* and *Sphagnum cymbifolium*, and fungus, *Cyatharia Gunnii*.

By Mr. A. J. Tadgell.—Growing orchid in flower, *Prasophyllum Suttonii*, Alpine Leek Orchid, collected at Mount Bogong, January, 1924; *Prostanthera (?) incisa*, from the Bogong district (further specimens required for complete identification); *Veronica arvensis* (introduced), from Bogong district (uncommon); Bristly Cloak Fern, *Notholaena (Cheilanthes) distans*, R. Br., from Keilor, a new district (S.), previously recorded only from E., "Snowy," and, for comparison, the closely-allied common Rock Fern, *Cheilanthes tenuifolia*, Burm., S.W.

By Mr. L. Thorn.—Specimens illustrating the life-history of the Mistletoe Blue Butterfly, *Ogyris olane*.

By Mr. J. Wilcox.—Flowering branches of the New South Wales Christmas Bush, *Ceratopetalum guineferum*, grown at East Camberwell.

After the usual conversation the meeting terminated.

EXCURSION TO THE NATIONAL PARK, WILSON'S PROMONTORY.

BY CHAS. DALEY, B.A., F.L.S.

THE connection of the Club with the establishment of the National Park is set out at length from time to time in the pages of the *Victorian Naturalist*, especially in the late Dr. T. S. Hall's historical account in January, 1905 (vol. xxi, p. 128), and in the reports of subsequent Club excursions dealing with the topography, natural features, the flora, and fauna of the Promontory, two of which are illustrated, and a map appeared in vol. xxii. These are listed in the *Naturalist* for January, 1920 (vol. xxxvi, p. 131). The last Club excursion took place in December, 1914, at a time when everyone was excited by the Great War, then in its infancy. Its long duration, and the subsequent aftermath, led to the National Park excursion being held over for some years.

The recent excursion (the fourth), however, differs in some respects from the previous ones, inasmuch as, on this occasion, owing to the erection of the Chalet by the trustees of the Park, facilities were available for the first time for comfortable accommodation without preliminary arrangements for camping and provisions. This also allowed of ladies taking part in the excursion without any great discomfort. Owing to insufficient accommodation for a large party, with great reluctance I had to notify several members who were desirous of going, but had not given early intimation of their intention, that the party must be limited to sixteen, who were as follow:—Mrs. Shiels, Miss R. E. Chisholm, Miss E. M. Haynes, Miss Morrison, Mr. and Mrs. L. Hodgson, Mr. and Mrs. V. Miller, Messrs. E. Cox, C. Daley (leader), H. B. Daley, V. Gray, A. E. Keep, H. McColl, C. R. Ralph, and L. Thorn.

Leaving Melbourne on Wednesday, 26th December (Boxing Day), by the 7.20 train for Bennison (110 miles), on the South-Eastern line, an uneventful journey was made, the chief feature noticeable being the tremendous denudation of heavily-timbered country along the route, bare hills and slopes being everywhere the rule. Owing to the falling of rain, the heavily-laden train was unable to make good progress up the slippery rails on several steep gradients, with the result that we arrived an hour late at Bennison. Transferring our luggage to the unique horse-tram—"the fish express"—we soon reached Port Franklin, only to find that the hour's delay had lost us the tide, and we must wait for the morrow before proceeding to the Vereker Landing, at the south-west corner of the Inlet. There is no accommodation house at the fishing village, and it was not until after much uncertainty and inquiry that we all got

put up for the night, Mr. Cripps, our boatman, and his brother, formerly ranger at the Promontory, kindly interesting themselves to provide comfortable quarters.

Port Franklin, a thriving fishing village, is on the high bank of the Franklin River overlooking the far-spreading mud flats on which, when the tide is low, thousands of small crabs scuttle and wild-fowl feed. Further out, "the mangrove sleeps upon the sea," and lines the river banks and flats with its sombre foliage. After tea some of us, in taking a walk along a bush road, came upon a full-grown Koala at the top of a gum-tree, its actions and appearance arousing considerable interest. Further on our attention was directed to the unusual sight of three Podargi, which, perched on a bough, in their immovability and colouring gave an effective exhibition of protective mimicry, being practically unrecognizable from the branch on which they sat.

On Thursday morning the party, with an addition of three others, left at 10.30 a.m., and, passing down the Franklin River into the Inlet, soon had a fine view of the Promontory in bold relief, with Snake Island on the east. Flocks of swans in flight and at rest were seen along the course. Passing Doughboy Island, a granite outlier of some size, a picnic party was seen on the southern side. Nearing the landing-place at the foot of the Vereker Range, smaller masses of granite rocks stand out from the sandy coast, their close resemblance to old haystacks into which the cattle had made inroads being very marked. One almost expected to see some "swain responsive as the milkmaid sung" appear in the distance. A vehicle took off the luggage of the nineteen passengers, and, after a preliminary cup of tea at the Rest House, our party started to walk across to the Chalet, six and a half miles distant.

The track offers no difficulty, at first passing for some distance through a well-grown grove, chiefly of the Saw Banksia, *B. serrata*, much frequented by Funeral Cockatoos, Wattleducks, and Pennant Parrots. The strong timber fence, about eight feet in height, has several parallel rows of barbed wire above, making either ingress or egress in connection with the park difficult. Passing out at the first gate, we went over heathy land, skirting a swamp. Here were gathered the Long Purple Flag, *Patersonia longiscapa*, and also the white Butterfly Flag, *Diplarrhena marua*. In very late flowering were also seen Early Nancy, *Anguillaria dioica*, Milkmaids, *Burchardia umbellata*, and the Bulbine Lily, *B. bulbosa*, whilst the Common Correa, *C. speciosa*, the Yellow Hakea, and the Scented Paperbark, *Melaleuca squarrosa*, all dwarfish in habit, were in bloom. A single spike of the Hyacinth Orchid, *Dipodium punctatum*,

was in bud, and also the Pale Leek Orchid, *Prasophyllum patens*, was gathered.

The latter part of the journey leads over or round the sand-dunes, here covered with a fairly dense growth of tea-tree and Sheoaks, *Casuarina stricta*, after which is the descent to the Derby River and the bridge, from which the Chalet is barely half a mile distant. Owing to four members of the Tourists' and Walkers' Club having to be accommodated, also a party of three persons from Welshpool, and the three members of the Council who arrived that evening, eight of the male members of our party had perforce to sleep at the original Rest House for the time being.

On Friday morning, after breakfast, a visit was made to the hill behind the Chalet, the steep track being followed to the summit, from which, amid the granite boulders, a splendid view of the coastal scenery, with its bays and islands, from Shellback to the Anser Group, was obtainable; then a descent was made to the beach at the mouth of the Derby River. Amid the scrub vegetation on the hill, mostly stunted Coast Tea-tree, *Leptospermum laevigatum*, there occurred in flower White Correa, *C. alba*, Sea Box, *Gynopogon (Alyxia) buxifolius*, the Scented Paper-bark, *Metaleuca squarrosa*, the Narrow-leaved Acacia, *A. linearis*. The pretty Paper-flower, *Thomasia petalocalyx*, the Horned Cone-bush, *Isopogon ceratophyllus*, Common Correa, *C. speciosa*, the Hop Goodenia, *G. ovata*, several species of Olearias, Golden and White Everlastings, *Helichrysum leucopsideum* especially; the Love Creeper, *Comesperma volubile*, and the erect species, *C. ericinum*, were also in bloom. On the rougher sea-front of this ridge grew some splendid specimens of the Cushion-bush, *Calceolaria Brownii*, one of which was fully eight feet in diameter. On the wind-blown sand the Hairy Spinifex, *S. hirsutus*, grew well. Returning after reaching the beach, along the margin of the river, the Bidgee-widgee, *Acacia songuisorba*, was in adhesive fruit, whilst the Purple Swainsona, *S. lessertifolia*, and Cut-leaf Cranesbill, *Geranium dissectum*, three species of Lobelia, and the Scented Fan-flower, *Scavola suaveolens*, were blooming freely. In the afternoon Tongue Point was visited by the track skirting the coast, fine clumps of Casuarinas, Native Cherries, *Exocarpos stricta* (in fruit), Coast Beard Heath, *L. Rickei*, the Sea Box, and Tea-tree giving shade and shelter until the open, heathy spaces with dwarfed vegetation are reached on this exposed Promontory, where the incessant and tremendous effects of wind and wave on the huge granite masses are very noticeable.

An early start was made on Saturday for an excursion to Tidal River and Norman Bay. The route passes the Darby

Swamp, or marsh, with its dense selvage of Tea-tree; then through a fine clump of *Banksia serrata*, over steep hills and vales in a southerly direction. Heathy vegetation clothes the slopes, amid which the Grass-trees, *Xanthorrhoea minor* and *X. australis*, grow, the former profusely, and the Common Fringe Myrtle, *Calytrix tetragona*, and the Dagger Hakea, *H. pugioniformis*, were in flower. About three miles on the track the first glimpse of the ocean reveals a splendid view down a sheltered valley: the line of white sand, the granite rocks, the breaking waves, and the islands beyond in the blue waters presenting a beautiful picture. At Whisky Creek the cool, pure water issuing from the granite hills provided a welcome draught. From this little creek, with its protecting verdurous covering, we passed to open undulating heath country, where the dwarf growth and the soft sand witnessed to the power of the prevailing westerly wind. In springtime this heath land is rich in flowers. After going six miles we diverted our course to the seashore, at Leonard Bay, into which a small tidal stream flows. The features of these bays are headlands of bold granite rocks on each side, water-worn boulders, caves, and passages at their base, a streamlet of wine-coloured water from the hills, and the beautiful, fine curved beaches of soft white sand extending between the rugged points. Another feature of the coast is the flotsam and jetsam driven in on the current which strikes the western shore. Here the time was pleasantly spent until, after a refreshing bathe, it was time to return.

Sunday was a free day, spent, for the most part, in reading, bathing, or in short walks. In the afternoon most of the party made an excursion along the timbered ridges towards the south through the fine Sheoak groves and exposed masses of granite. From here the destruction of eucalypts by the Koalas two or three years ago was noticeable, the leaves of the species *E. globulus*, *obliqua*, and *Gunnii* being eaten until the trees died, and, as a consequence, a great number of the bears also.

On Monday a visit was made past the Derby River mouth to the cliffs and kitchen middens which are a feature of this part of the coast. The sandstone cliffs, weathered and worn into fantastic forms and shapes, are very interesting. They show good examples of current bedding—on the top are worn into fantastic caves, and over their ragged edges here and there falls perpendicularly a shower of fine sand, in the manner of a waterfall. Sometimes the sand appears to blow up as from a vent before falling outwards. Dune limestone is exposed in some places on the shore. Along this coast, right up to Fish Creek and beyond, the aborigines roamed and found abundant food in the adjacent sea. Their middens were generally in a place sheltered from the wind. Here they feasted on shell-fish,

the remains of Turbo, Patella, Mytilus, Haliotis, &c., being numerous, whilst bones of animals are found also. With the action of the wind the middens may be covered over or laid bare, revealing characteristic evidences of the stone age in which the blacks lived. Occasionally a stone axe, grinding, or hammer-stone may be found, and chips of quartz or of flint are obtainable. These, from the nature of the materials, show little evidence of definite workmanship, the quartz being easily obtainable from the disintegrated granite in angular fragments suitable for immediate use, whilst any chip from a flint has a cutting edge, hardly needing secondary working. The flint was obtainable from nodules encrusted with calcareous matter, which, as at Torquay, Cape Wollomai, and elsewhere, are washed in from the sea, and from which the chips were struck off as required.

On New Year's Eve two of our party and the members of the Walkers' Club left for Melbourne, and by common consent, after some community singing, we decided to see the old year out at 10.30 instead of 12 p.m., when we sang the National Anthem and "Auld Lang Syne," made the usual felicitations, and went to bed.

Next morning (Tuesday, 1st January) quite a varied procession left the Chalet at 9 a.m. for the trip to Sealers' Cove. As the whole of our party could not go, Messrs. Kershaw, Thorne, and Feveril very kindly arranged to take the ladies to Lilly-pilly Gully, a typical fern gully, Messrs. Cox and Miller also going, whilst six others went with a pack-horse to Sealers' Cove. For about six miles we journeyed together, four horses having been supplied for the convenience of the ladies. The track was the same as to Tidal River, then turned eastward through the open, heathy rises, where the Lilly-pilly track branched off, and the Sealers' Cove party followed the telegraph line, passing about half a mile further on through the morass where the Tidal River makes its way to Norman Bay. The vegetation was very dense on the rich peaty soil, *Leptospermum*, *Melaleuca*, many species of reeds, *Scirpus*, and swamp-grasses assisting to make the scrub almost impenetrable. The Golden Spray, *Viminaria denudata*, was in flower, also the Purple Bladderwort, *Utricularia dichotoma*, the Ivy-leaf and the Purple Violets, the Forked Drosera, *D. binata*, with attractive white flowers. The Bluebell, *Wahlenbergia gracilis*, and the Blue Pincushion, *Brimonia australis*, were occasionally seen. Reed-Warblers could be heard in full song. Other birds seen in crossing the heath were the Pennant Parrots, Spur-winged Plovers, and some Cormorants. Very small Mountain Trout, *Galaxias*, were in the stream, in which one would naturally expect to find Blackfish.

Leaving the marshy area, the track gradually rises at the base of granite slopes until the foot of the Bad Saddle is reached. Here the gradient is very steep, the granite very much disintegrated on the surface, showing tourmaline very steely, and the track is worn down and broken by water action into channels, making the ascent difficult. "Bad" Saddle was so obviously a term of flattery that we wondered at the name's poor command of English adjectives. Leaving the Bad Saddle for better or worse, we turned eastward and followed a well-graded, stony track cut out of the hillsides above the valley of Titania Creek far below. The sun's rays were reflected from the hills, making the track hot, and the water-soaks were here also below. We were glad at last to reach a spot where, with a little patience, we could get a few billies of water above a steep fern gully just below the track. After lunch and a rest, resuming our journey, we found more shade from the sun, and generally improved conditions for walking. Passing between Mount Ramsay and the Mount Wilson Range, we reached the saddle from which the long descent to Sealers' Cove is made. The difference between the western slope and the eastern is very marked. The former was dry, and vegetation somewhat sparse; ferns almost absent. The eastern side was well shaded, plentiful streamlets crossed the path, which was soft and cool to the tread, whilst the vegetation was tropical in its luxuriance. Stately tree ferns, Dicksonias, Alsophilas, and Cyatheas, above the smaller ferns—Doodias, Blechnums, Gleichenias, Todeas, Polypodiums, &c. The characteristic trees of Gippsland or the Dandenong fern gullies grew closely together down the slopes—Blackwood, Lilly-pilly, Hazel, Myrtle Beech, Musk, Blanket-wood, Sassafras, Native Mulberry, &c., in great profusion and growth. *Acacia verticillata* and the Sweet Bursaria, *B. spinosa*, have here much softer and more succulent foliage than I have seen elsewhere, and the Common Heath, *Epacris impressa*, quite profuse foliage and a shrubby appearance. On the moist track grew many seedlings, and on the trunks of the tree-ferns, and on fallen limbs, &c., epiphytal ferns, mosses, and lichens grew luxuriantly. The dead trunks of enormous gum-trees, probably *Eucalyptus amygdalina*, towered above the green vegetation. The Sword-grass, *Lepidosperma*, along the track was very rank, some leaves reaching ten feet in length, forming, where not cut, an obstacle to progress. Crossing the rough bridge over Sealers' Creek, we soon picked a site and erected the tent. After it had been put in order we found that we had encroached on the claim of a nest of bull-ants, who, until disposed of by Mr. Thorne, were very active. Precautions taken were effective, no retaliatory measures being taken.

Sealers' Cove is beautifully situated. It is somewhat oval in shape, like the letter C, the amphitheatre of mountains and hills enclosing the well-watered and profusely-timbered valleys stretching down to it ending in a prominent hill of considerable height on each side of the entrance. It is thus effectually protected from the westerly winds, and also from the southerly and south-easterly blasts. Thus favourably sheltered, it forms a haven in time of tempest which intercolonial vessels have frequently sought when hard beset. Vegetation comes close to the beach. The shore is of that soft, white, musical sand characteristic of the Promontory. The tide comes in with a distinctly tired feeling about it, and, without breaking, "slops" upon the beach. In its quiet waters shells are numerous. No mangroves were noted, conditions being unfavourable for growth. Sealers' Creek enters on the southern side of the cove with a considerable volume of water. From point to point around the beach would be about one mile and a half. Rising early, we followed the shore around to the outlying rocks towards the northern end. There was little life of any kind to be seen, Terns and Gulls being the only creatures visible. We saw fresh tracks of a large Kangaroo on the sand, and also those of a prowling fox.

Our stay was necessarily short, and we were agreed that on another occasion a camp of several days' duration would, from a collector's standpoint, be worth consideration.

Next morning, at 10.30 a.m., after a refreshing bathe, we started on the return journey, and traversed the long up-grade through the delightful semi-clad valleys and hill slopes until we crossed to the western side. On the track several large spikes of the Sun Orchids, *Thelymitra aristata* and *T. longifolius*, were gathered. About a mile from the Bad Saddle we saw a Koala which, startled by the attention it received, in springing from one tree to another, miscalculated, and came to the ground. Mr. Hodgson captured it and carried it as far as Titania Creek, where it patiently hung by its fore-paws to the top of a post. When placed on a tree at our departure it climbed rapidly to the top, crying and calling out pitifully. In Titania Creek we noticed many small Galaxia Trout. After lunch we resumed our journey over the marshy country to Tidal River and the stretches of heath, where several Whistling Moths attracted our notice, Mr. Thorne obtaining several specimens. A lone sentinel on a distant hill proved to be Mr. Kershaw. On arrival at Whisky Creek we were pleasantly surprised to find that some of the ladies had come that distance to prepare afternoon tea—a kindly and thoughtful act for which we were very grateful. We reached the Chalet at 7 p.m., a misty rain falling on the way;

Thursday morning saw us early astir, leaving the Chalet at 6 a.m. to walk across to the Corner, horses being kindly placed at the services of the ladies when tired of walking. The boat and the tide alike awaited us, and with a freshening breeze we had a most enjoyable run up to Port Franklin, returning to Melbourne by the slow-moving train leaving Bennison at 1.20 p.m.

A few general remarks might be made in regard to the National Park. We were rather disappointed at seeing so few animals. Black-backed Wallabies were seen on several occasions, and appear to be on the increase. No Kangaroos were observed; probably the eastern side of the Promontory, with its sheltered forest country, would be more favourable for them. Over two years ago, on a visit to the Vericker Range, I saw at least half a dozen Kangaroos. Of course, a small party has a better chance for observation than a large one. Foxes and rabbits have, unfortunately, obtained a footing, and may yet prove a nuisance, as elsewhere. Wild-fowl were not numerous, rivers and swamps away north being well provided with water. It is in dry seasons that numbers come south. Bird-life was abundant in the scrubs and along the Darby River, the vocal chorus, especially at dawn, being varied and tuneful, many unfamiliar notes being heard. On the track to the Cove there appeared to be signs of the Lyre-birds scratching, but none were seen or heard in this suitable environment. The Wonga and the Bronze-winged Pigeon should do well on the Promontory. Probably the latter is found here. Emus have become well established, and were seen in the neighbourhood of the Chalet. A few small snakes of the Copperhead species, *Denisonia superba*, were seen, and the tracks of a large snake were seen several times crossing the sandy road by the Derby River. One or two Blue-tongued Lizards basked listlessly in the sun. While resting, a small lizard, *Egernia whitii*, gave an interesting exhibition of fly-catching, using Mr. Gray's outstretched form as a field of operations. Its agility was very great, and it showed no fear of being handled. This species of small lizard was numerous. Insect-life was abundant, some fine Jewel Beetles, *Buprestidae*, being obtained.

There is a remarkable uniformity in the granitic formation which, with the sands, gravels, and clays derived therefrom, constitute the Promontory. The granite contains very large crystals of quartz and orthoclase felspar, which, on the western coast, stand out very prominently under the effect of weathering. Near Oberon Bay the crystallization is said to be finer, almandine garnets occurring. Muscovite and biotite are both found in the composition of the granite, and tourmaline is

common. At Sealers' Cove at one place the sand was coarse and crystalline, and it is not unlikely that gem stones might occur on the eastern ranges, especially to the north-east, where prospecting for tin has been carried on intermittently. I was assured by a man familiar with that region that he had frequently washed off with a dish in the gullies fine samples of stream tin.

There is a great variety of vegetation on the Promontory. No plant was seen that is not already on record. Owing to destruction by fire, by native bears, and also by human agencies in earlier periods, eucalypts are not very numerous, although, judging by the gaunt, grey trunks stretching their leafless arms to the sky on many of the ranges, at one time the forests must have been extensive. On the eastern slope, protection from the western winds and currents, a more favourable aspect, and probably moister and warmer conditions, account for the luxuriant vegetation as compared with that on the wind-swept and exposed western slope. The Austral Cabbage Palm, *Livistona australis*, from Gippsland, planted at Lilly-pilly Gully and elsewhere, is flourishing. The Kanooka, *Tristaniia laurina*, the Gum Myrtle, *Angophora intermedia*, and the Mahogany Gum, *Eucalyptus boiryoides*, would probably thrive at Sealers' Cove if planted, perhaps also the Bloodwood, *E. corymbosa*, and the Currajong, *Brachychiton populneus*, for conditions for growth seem similar.

When the proposed road from Fish Creek or Foster is made through the isthmus, the Promontory will be more attractive to tourists, if less so to lovers of Nature who appreciate the free, open life of its solitary spaces.

Mrs. Weston, lessee of the Chalet, did everything possible to make our party comfortable, and opportunity must be taken to express our appreciation of the kindly advice, assistance, and consideration of Mr. J. Kershaw and his *confreres*, Messrs. Thorn and Peveril, tending to make our visit enjoyable and interesting. A fine feeling of *camaraderie* amongst the members and harmonious co-operation ensured the success of the excursion.

THE KOOKABURRA AS A FISHER.—In connection with this bird, Mr. Fisher adds that "the Great Kingfisher" is a more persistent fisher than is generally realized. He has seen as many as thirty small English perch brought to one nest in an afternoon as food for the young. About the city many instances have been known in which goldfish ponds in a garden have been quite cleared out before the owners discovered that the thieves were early morning "Jacks."

BUTTERFLY COLLECTING IN NORTHERN NEW SOUTH WALES AND SOUTHERN QUEENSLAND.

BY A. N. BURNS AND L. B. THORN.

(Read before the Field Naturalists' Club of Victoria, 12th Nov., 1923.)

HAVING received a letter from Mr. G. A. Waterhouse, F.E.S., of Sydney, intimating that he was going up to the Richmond River on an entomological excursion in September of last year, we made arrangements to accompany him, and on Wednesday, 20th September, boarded the Sydney express as the commencement of the trip, arriving in Sydney the next day, tired after all the excitement of the previous day's packing up and the long and continued din of the train journey.

In Sydney we had a couple of days in which to rest, but on the Friday found ourselves eager to get out into the bush, so took the day out to Narrabeen. This is one of the most delightful trips around Sydney, and affords one an opportunity of seeing one of the finest parts of the harbour—that between Sydney and Manly. Then there is a tram run of about eight miles, through fine collecting country. At Narrabeen itself the general aspect of the country is different. There we have shale formation, and consequently the fauna and flora are different to that on the sandstone which surrounds Sydney and suburbs. The day being fine and warm, there were many species of insects on the wing. We devoted our attentions to moths and butterflies (Lepidoptera), also Hymenoptera (wasps and ants), and were successful in securing among our captures some fine specimens of one of our early Satyrids, *Argynnis hadartia cyrila*, Nor. This butterfly ranges from Tasmania to Sydney, and specimens from the mainland differ considerably from Tasmanian examples. It is also interesting to note that specimens from Narrabeen were much larger and even brighter than specimens taken in Southern New South Wales and Victoria. The well-known Wanderer Butterfly, *Danaida archippus*, Fab., was exceedingly plentiful, and numbers of its larvae were observed on the food plant, the White Cotton or Milk-weed, *Comphoocarpus fruticosus*. Several species of parasitic wasps, Ichneumonidae, were taken, also one fine Braconid, also parasitic on larvae, and specimens representing some four other groups were also secured. One showy species of beetle belonging to the family Chrysomelidae was exceedingly abundant on the young shoots of the Sweet Bursaria, *Bursaria spinosa*. We decided to leave for Sydney early in the afternoon, as we were anxious to set our captures before packing our setting cases for the journey northward.

On Saturday evening we met our friend Mr. Waterhouse, and at 6 p.m. boarded the North Coast Steamship Co.'s s.s.

Burringbar. The trip on the boat was delightful, and on the Sunday we found ourselves watching the porpoises sporting in the water, and numerous sea birds—including at one time fourteen Albatrosses—following the wake of the steamer. We also found great interest in locating and identifying the various bays and coastal features from a map that Mr. Waterhouse had brought with him. Daybreak on Monday found us drawing up to the pier at Byron Bay, the most easterly point of Australia, and ere long we were being swung ashore in a basket. Lying on the beach, and embedded firmly in the sand, was the wreck of the *Wollongbar*, which broke her moorings some eighteen months previously owing to the very heavy sea, and before her engines could be started she had drifted on to the beach.

We breakfasted at Byron Bay, and at 8 o'clock caught the train to Bangalow, a distance of eight miles. The scenery on this part of the journey was very fine, and all new to us. Impenetrable thickets of lantana bordered the palm and scrub patches, also the banana plantations, and huge fig-trees festooned with climbing vines and ferns towered to a height of over a hundred feet. On one occasion we observed a very large flock of Straw-necked Ibises feeding in a swamp, and heard the calls of many water-birds quite new to us. Arriving at Bangalow, we still had 17 miles to go ere we completed the journey; this was done by car, and took us past fine fields of sugar-cane, banana and pineapple plantations, and here and there patches of scrub and lantana. The weather was very fine and warm, and encouraged our hopes of having good success throughout the trip. At 10 a.m. we found ourselves at the Commercial Hotel, Ballina, at the mouth of the Richmond River, and our destination. We were not long getting our luggage to our rooms and getting changed, so as to have a look round before lunch. We secured several species of Hesperiidae (Skipper Butterflies) on the lantana flowers, and observed other species, which we obtained later. In the afternoon we went to Fishery Creek, about one and a half miles distant. There was a fine patch of scrub, and we had not to wait long ere we saw, flying high amongst the tree-tops, a male specimen of the glorious Bird-wing Butterfly, *Troides priamus richmondius*—the latter name being to signify the most southern limit of the *Troides*, or bird-wing butterflies. This was a sight never to be forgotten, and one we had long looked forward to seeing.

The next day found us up early, and a friend of Mr. Waterhouse's, a Mr. Robinson, of Rous, some fifteen miles distant, also a keen entomologist, called with his car to take us to some of the best collecting spots round Ballina. One patch we visited

in the afternoon, on the North Creek road, some five miles from the town, proved very productive, and on frequent visits paid there afterwards turned out to be the finest spot in the district. There we secured fine specimens of the showy *Troides*, also *Papilio aegeus*, *P. anactus*, *P. lycæon*, and the beautiful Kite *Papilio*, *P. leosthenes*, and there we also saw the Glassy Swallowtail Butterfly, *Eurycea cressida cressida*, and later secured a specimen at another patch. Butterflies of the family Nymphalidae were not so plentiful; two common and familiar Victorian species were met with—namely, *Pyrameis ilea* and *P. cardui kershawi*. We also observed the fine large-tailed Nymphalid, *Eulepis pyrrhus sempronius*, and several other representatives of the Nymphalidae. Blues, or Lycaenids, were not numerous in species, but fairly so in individuals. Whites, or Pierids, were well represented. Satyrids, or Forest Butterflies, were represented by four species; and, lastly, the Skippers, or Hesperiidae, contributed some fourteen or fifteen species. The scrub at the North Creek road patch was very dense, consisting chiefly of large figs festooned with creepers and the well-known lawyer vine, and fine large specimens of the Stinging-tree; in some cases this grew to a height of about 50 feet. Gigantic Bird-nest Ferns and Stag and Elk Horns, also orchids, were numerous on the branches and trunks of the larger trees. At the back of this patch was a grove of Bangalow Palms, *Archontophoenix cunninghamiana*, in a swamp; some of these were up to 60 feet high, and covered with a species of wild *Convolvulus* and wild *Wisteria*, both species were flowering. The scrub, as a whole, was bordered with the lantana bushes, on whose flowers the butterflies used to feed, so we were able to do the best part of our collecting on the fringes of the scrub. The large *Troides* butterfly could be most easily secured in the early morning, when it came down within easy access of the net to feed on the lantana flowers. A very successful method we adopted for securing these butterflies was to take pieces of crimson flannel and put them on the bushes; the butterflies flew down near this, probably believing it to be a red flower, and so, by the use of a long stick to the nets, we secured a good series of specimens.

As we wished to see as much variety of country in which to collect, we took several trips to the South Beach, which was reached by taking a motor launch across the river. This was typical heath country, *Leptospermum*, Banksias, and other typical coastal plants growing in great profusion. We secured species there that we did not observe at the scrub patches, and on the flowering bushes, mostly *Leptospermum*, secured many fine species of Hymenoptera, seven species of Buprestid or Jewel Beetles, some fine flies (Diptera), besides about 100 species

of moths. Snakes were very numerous. Turning over one log we disturbed three, of which we killed two, and on each visit to South Beach always saw several. Large Goannas and lizards of many species were also abundant. A day's collecting at this spot could always be well ended by going out on to the stone breakwater, where rock oysters were very plentiful, and on several occasions we ended a perfect day's collecting by visiting this spot with screwdrivers.

Up to this time we had spent about ten days at Ballina, when Mr. Waterhouse, whose chief aim on the trip was to secure larvæ, pupæ, and perfect specimens of *Tisiphone abeona*, form *morrisi*, one of the Satyrids, was unable to secure all he required, so unfortunately he decided to leave us and go to Urunga, at the mouth of the Bellinger River, some 160 miles south, where that species also occurs, though limited in its range between Urunga and the Richmond River. Mr. Waterhouse is engaged on research work crossing certain forms of the *Tisiphone* butterflies, and was fortunate in securing, at Urunga, almost as many specimens as he required for his experiment. We had searched most of the swampy places near Ballina previous to Mr. Waterhouse's departure for this butterfly, but with little success, and about a couple of days later found a fine swamp of Sword-grass, *Gahnia*, on which the butterfly feeds, at the South Beach, where the butterflies were flying plentifully. A search of the Sword-grass plants for larvæ or pupæ, however, proved unsuccessful. Another locality we also visited was the cutting at Alstonville, some ten miles from Ballina. To reach this spot we took the Lismore service car at 8 a.m., and arranged for them to pick us up on the roadside on the return trip at 5.30 p.m. On the first occasion, however, the car driver did not remember to stop for us, so we were left to walk the ten miles to Ballina, which prospect we certainly did not relish, having tramped about twelve miles during the day. We, however, trudged on, and had gone about seven miles when we were picked up and given a buggy ride to our destination, and was probably, if not, the most enjoyable buggy trip we ever had. We paid Alstonville three more visits, but made quite certain each time afterwards not to be left to walk home again. We were very interested collecting at this place, for we secured several life-histories there, and one or two species of moths that we did not see elsewhere. We saw also the largest snake seen on the trip, just as we were preparing to return to Ballina. It crawled out from the thicket of lantana and coiled itself up on some flat rocks near a watercourse. This gave us a grand opportunity of seeing a fine specimen of the Carpet Snake, measuring fully eleven feet in length. At this same spot we also observed several very large Black Snakes and one green Tree Snake.

Our evenings at the hotel were always fully occupied. We had our setting boards in travelling cases with us, so were able to set up and label each day's captures—a method much preferable from taking home unset specimens and then having to relax them again for setting. Several visitors at the hotel were keenly interested in our work, and requested us to explain the methods employed in capturing specimens, &c., which we gladly did, and were rewarded by having quite a number of specimens brought to us nearly every evening.

We had now spent three weeks at Ballina, so decided to leave next day (Tuesday, 16th October); at 6.30 a.m. we were all packed up ready to go on to Brisbane. We had to re-car back to Bangalow, then train to Murwillumbah, on the Tweed River. This was a glorious spot, with beautiful river and palm scrub scenes amid fields of sugar-cane, bananas, &c. Behind the town of Murwillumbah rises up Mount Warning, a lofty, abrupt peak rising above the surrounding ranges, the summit of which was intermittently enveloped in cloud, and gave beautiful reflections in the calm water of the Tweed River. The next stage, and perhaps the most beautiful, was the twenty-mile boat trip from Murwillumbah to Tweed Heads. A winding passage through islands of tropical jungles, and wonderful cloud effects amid the surrounding mountains, afforded us a memorable sight, not to be forgotten. We passed the sugar-crushing mills and numerous river steamers towing barges of sugar-cane to the mill. Nearing our destination, we were aroused by hearing the captain call out that there was a large snake on a log, and, on looking towards the spot indicated, observed a large Carpet Snake, equal in proportions to the one we saw at the cutting at Alstonville. Tweed Heads being reached about 2 p.m., we had our luggage conveyed to the railway station, where we boarded the train to Brisbane. The Queensland trains appeared very diminutive to us, the gauge being 3 feet 6 inches. The scenery between Tweed Heads and Brisbane was totally different from that at Ballina or Murwillumbah. Vast Melaleuca swamps and eucalypt forests took the place of the scrubs, and we were particularly struck by the number of trestle bridges and deep gullies over which the line was constructed. We reached Brisbane at 7 p.m., thoroughly tired out, so our first thought was to find accommodation for the night and get a good sleep, so as to be fresh for next day.

Our first and second days in Brisbane were spent in visiting entomologists there, and also in visiting the Museum, Gardens, and University. On the evening of the second day—Thursday—we left Brisbane by the 5 p.m. train for Palmwoods, 60 miles north, on the Gympie line, and arrived at our destination at

9 p.m. We secured accommodation at the hotel, and next morning found us up early, ready to walk to Montville, at the top of the Blackall Ranges. The day was very hot and trying, but we steadily kept on, and about lunch-time reached the summit, where we intended to do some collecting. We secured several species of butterflies and moths not taken by us at Ballina, and on walking round soon found ourselves talking to a resident, who was working in his orange grove. He kindly offered us oranges, which we gladly accepted, and showed us the damage that was wrought by the fruit fly, orange bug, and green grasshopper to the orange trees, and also gave us permission to collect any specimens we might like in and about the orchard. We observed there the species of Swallowtail Butterflies that are orange feeders—*Papilio aegeus*, *P. anactus*, and *P. sthenelus*. Of the former species we secured larvae and pupæ on the trees. We then commenced to retrace our steps, and reached the hotel at about 6 p.m., tired out after the day's climbing.

Next day we decided to follow the Buderim Mountain tram line, the gauge of which is 2 feet 6 inches, and reminded us very much of the narrow-gauge railway from Ferntree Gully to Gembrook. We did not go far along this track before we came across large numbers of a butterfly we were most anxious to secure. This was another form of the group on which Mr. Waterhouse is working—*Tisiphone abeona ravensteini*; so we decided to take a long series of it, as we knew it would be of considerable value to have a supply of perfect specimens. The third and our last day at Palmwoods was occupied in rambling round Palmwoods township. We secured more *ravensteini* and several other species not before taken by us. The palm groves in this district were even finer than those seen on the Tweed or Richmond Rivers, and looked particularly fine with the large forest trees in the background. That evening the return to Brisbane was made, and we arrived there about 9.30 p.m.

Next day we visited One Tree Hill, four miles out of Brisbane, and there did some fine collecting. We secured a fine series of the Glassy Swallowtail Butterfly, *Eurytus cressida cressida*, and the life-history and a female specimen of one of the largest and most beautiful Australian Lycaenids, *Ogyris zozine zozine*, Hew. The larvae and pupæ of this butterfly are found at the base of eucalypts bearing mistletoe, *Loranthus*, and are always attended by ants—one of the sugar species, or *Camponotus*. It is interesting to note these larvae feed by night on mistletoe, and hide by day at the base of the host tree, the attendance by ants being due to the fact that the larvae secrete a saccharine substance from two glands situated at the posterior end of the

body. This life-history, including many others taken on the trip, was also handed to Mr. Waterhouse as we passed through Sydney on the return trip, to be figured in his new book on the life-histories of Australian butterflies.

The next morning, at 7.45 a.m., we left Brisbane on the commencement of the return journey, and travelled *via* Tweed Heads, the only alteration made being that we took the motor service car from Tweed Heads to Murwillumbah instead of the steamer, so we were able to replenish our memories with the glorious scenery we had passed through a week previously. We left Murwillumbah about 3 p.m., reaching Byron Bay at 5.30 p.m., and, after having tea there, boarded the s.s. *Orara* at 7 p.m. Next evening, at 6.30 p.m., we called at Newcastle for coal, so, having a few hours there, went ashore to see the city. We returned to the boat about 10.30 p.m., and retired for the night thoroughly tired, and when we awoke next morning at daybreak we were just coming up to the wharf at Sydney. We had now five days left in which to see Sydney, so we visited the Museum, Gardens, Art Gallery, and, on the Sunday afternoon, visited the famous Sydney Zoo—Taronga Park. We also re-visited Narrabeen and secured some more specimens there—one or two not taken on the previous visit there—and were very fortunate in taking a fine aberrant example of the common Brown Butterfly, *Heteronympha merope*, Fab.

On Tuesday, 31st October, we left by boat for Melbourne, and had a very interesting voyage across. The Wednesday on board we amused ourselves watching thousands of the Sooty Petrels or Mutton-birds making south to their nesting rookeries at Cape Wollomai, Phillip Island. Next day, at daybreak, we entered Port Phillip Heads, and by 10 a.m. were tied up at Port Melbourne Pier.

The following is a list of the specimens of butterflies secured and noted on the trip, also the life-histories obtained:—

BUTTERFLIES TAKEN AT RICHMOND RIVER, N.S.W.

FAMILY NYMPHALIDAE.

SUB-FAMILY DANAINAE.

Danaida archippus, Fabricius.

Danaida chrysippus petilia, Stoll.

Danaida affinis, Fabricius.

Danaida melissa hamata, Macleay.

SUB-FAMILY SATYRINAE.

Melanitis leda bankia, Fabricius.

Ypthima arctous, Fabricius.

Hypocysta metirius, Butler.

Heteronympha merope merope, Fabricius.

SUB-FAMILY NYMPHALINAE.

Eulepis pyrrhus sempronius, Fabricius.
Phaedyma shepherdii shepherdii, Moore.
Precis villida villida, Fabricius.
Pyrameis cardui kershawi, M'Coy.
Pyrameis itea, Fabricius.
Argynnis hyperbius inconstans, Butler.

SUB-FAMILY ACRAEINAE.

Acraea andromacha, Fabricius.

FAMILY LYCAENIDAE.

SUB-FAMILY LYCAENINAE

Candalides xanthospilos, Hubner.
Candalides absimilis, Felder.
Candalides erinus, Fabricius.
Thysanotis hymetus taygetus, Felder.
Nacaduba lineata lineata, Murray.
Nacaduba felderii, Murray.
Erebia argiades, Pallas.
Zizina labradus labradus, Godart.
Neolucia agricola agricola, Westwood.
Theclinesthes scintillata, Lucas.

SUB-FAMILY OGYRINAE.

Ogyris amaryllis amaryllis, Hewitson.

FAMILY PIERIDAE.

Delias argenthona argenthona, Fabricius.
Delias nigrina, Fabricius.
Delias nysa nysa, Fabricius.
Elodina parthia, Hewitson.
Elodina egnatia angulipennis, Lucas.
Anaphaeis java teutonia, Fabricius.
Huphina perimale scyllara, Macleay.
Appias paulina ega, Boisduval.
Calopsilia scylla gorgophone, Boisduval.
Terias libythea zoraide, Felder.
Terias hecabe sulphurata, Butler.

FAMILY PAPILIONIDAE.

Troides priamus richmondius, Gray, Birdwing Butterfly.
Papilio aegeus aegeus, Donovan.
Papilio anactus, Macleay.
Papilio demoleus sthenelus, Macleay.
Papilio sarpedon-choredon, Felder.
Papilio euryplus lycaon, Westwood.
Papilio leosthenes, Doubleday.

FAMILY PAPILIONIDAE—continued.

Papilio fuscus capaneus, Westwood.*Papilio macclayanus*, Leach.*Eurytus cressida cressida*, Fabricius.

FAMILY HESPERIDAE.

SUB-FAMILY TRAPEZITINAE.

Trapezites eliena, Hewitson.*Mesodina halyzia halyzia*, Hewitson.*Hesperilla ornata ornata*, Leach.*Hesperilla donnysa*, Hewitson.*Hesperilla picta*, Leach.*Toxidia peroni*, Latrielle.*Toxidia leucostigma leucostigma*, Meyrick and Lower.

SUB-FAMILY ERYNNINAE.

Padraona lascivia, Rowenstock.*Padraona flavovittata flavovittata*, Latrielle.*Padraona sunias*, Felder.

SUB-FAMILY ISMENINAE.

Hasora discolor mastusia, Fruhstorfer.*Hasora haslia*, Swinhoe.

SUB-FAMILY HESPERINAE.

Netrocoryne repanda, Felder.

A few species were added from Queensland, and are as follows:—

FAMILY NYMPHALIDAE.

SUB-FAMILY DANAINAE.

Euploea corinna corinna, Macleay.

SUB-FAMILY SATYRINAE.

Hypocysta irius, Fabricius.*Tisiphone abeona rawnsleyi*, Miskin.

FAMILY LYCAENIDAE.

SUB-FAMILY LYCAENINAE.

*Candalides hyacinthina (eugenia ?) (nov.)**Theclinesthes miskini*, Lucas.

Some stage in the life-history of each of the following species was obtained:—

FAMILY NYMPHALIDAE.

SUB-FAMILY DANAINAE.

Danaida archippus, Fab., eggs and larvae.*Euploea corinna corinna*, Macleay, larvae.

SUB-FAMILY NYMPHALINAE.

Phaedyma shepherdii shepherdii, Moore, pupae (from Mr. Robinson).

FAMILY LYCAENIDAE.

SUB-FAMILY LYCAENINAE.

Candalides absimilis, Felder, eggs, larvae, and pupae on five food plants.

Nacaduba felderri, Murray, larvae and pupae.

SUB-FAMILY OGYRINAE.

Ogyris amaryllis amaryllis, Hewitson, larvae and pupae.

Ogyris zozine, Hewitson, larvae and pupae.

FAMILY PIERIDAE.

Delias nigrina, Fabricius, larvae and pupae.

Elodina parthia, Hewitson, larvae.

Elodina egnatia angulipennis, Lucas, larvae.

Anaphaeis java teutonia, Fabricius, larvae and pupae.

Huphina perimale scyllara, Macleay, larvae and pupae.

FAMILY PAPILIONIDAE.

Papilio aegeus aegeus, Donovan, eggs and larvae.

Papilio leosthenes, larvae.

FAMILY HESPERIDAE.

SUB-FAMILY TRAPEZITINAE.

Hesperilla ornata ornata, Leach, pupae.

Hesperilla donnysa, Hewitson, pupae.

SUB-FAMILY HESPERINAE.

Netrocoryna repanda, Felder, larvae and pupae.

SUB-FAMILY ISMENINAE.

Hasora haslia, Swinhoe, larvae and pupae.

We hope this list may help other lepidopterists should they ever contemplate taking a collecting trip to the Richmond River district, and that it will give some idea as to what species of butterflies they may expect to find. It may well be termed "an entomologists' paradise."

EXPLANATION OF PLATE.

Family Lycaenidae—Blue Butterflies.

- 1.—*Ogyris zozine*, Large Mistletoe Blue—(a) Male ; (b) Pupa.
- 2.—*Ogyris amaryllis*, Satin Blue—(a) Male ; (b) Female ; (c) Pupa.
- 3.—*Candalides absimilis*, Pencilled Blue—(a) Male ; (b) Female ; (c) Pupa.

- 4.—*Nacaduba felderri*, Little Blue—(a) Female ; (b) Pupa.

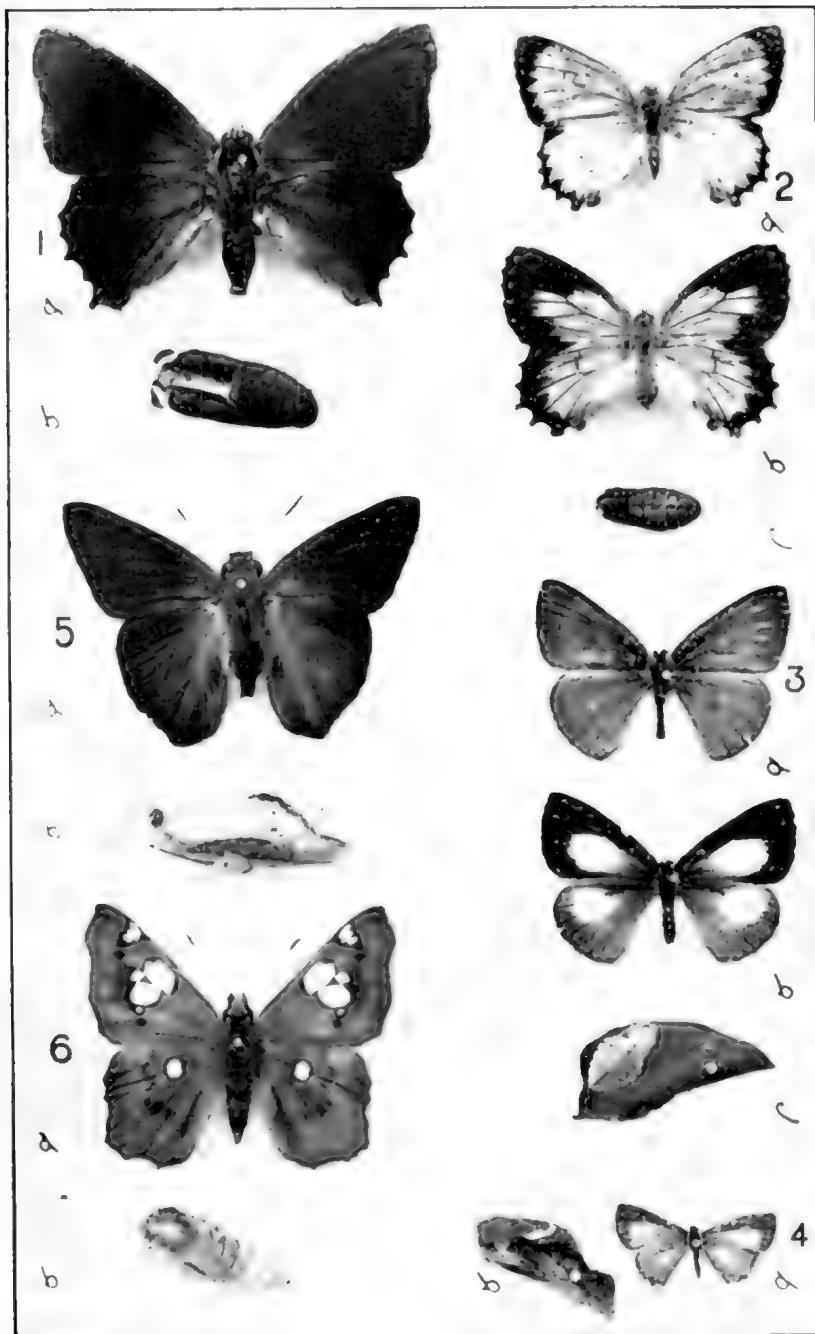
Family Hesperiidae—Skipper Butterflies.

- 5.—*Hasora haslia*—(a) Male ; (b) Pupa.
- 6.—*Netrocoryne repanda*—(a) Male ; (b) Pupa.

CORRECTION.

- 5.—(b) is the pupa of *Netrocoryne repanda*.

- 6.—(b) is the pupa of *Hasora haslia*.



SOME BUTTERFLIES FROM NORTHERN NEW SOUTH WALES
AND SOUTHERN QUEENSLAND.

DESCRIPTION OF A NEW VICTORIAN PLANT

BY H. B. WILLIAMSON, F.L.S.

(With Plate.)

(Read before the Field Naturalists' Club of Victoria, 11th Feb., 1924.)

FAMILY EPACRIDACEÆ.

Tribe STYPHELIAE.

CHORISTEMON, n. gen.

Frutex parvus, floribus 1-3 sessilibus ramulos terminantibus, bracteis 2, sepalis 5 marginem imbricatis, corolla campanulata lobis vix patentibus aestivatione valvatis intus fere glabris, filamentis planis infra ovarium affixis a tubo omnino separatis coquo æquilongis, antheris paulo exsertis erectis prope basin dorsifixis distincte 2-locularibus, disco hypogyno annulari sinuoso, ovario 5-loculato, stylo brevi.

Small shrub with flowers 1-3 sessile, terminating the branchlets. Bracts 2, sepals 5, imbricate. Corolla campanulate, with lobes scarcely spreading, valvate in bud, inside almost glabrous. Filaments flat, inserted below the ovary, quite separated from the tube, and equal to it in length. Anthers slightly exserted, erect, dorsifixated near the base, distinctly 2-celled. Hypogynous disc annular, sinuous. Ovary 5-celled. Style short. Fruit not seen.

CHORISTEMON HUMILIS, n. sp.

Frutex parvus circiter 15-cm. altus, ramis virgatis glabris, foliis 5-8 mm. longis lanceolatis rigidis acutis concavis minute ciliatis infra satis distincte 3-costatis, floribus 1-3 sessilibus ramulos terminantibus raro solitaris axillaribus, bracteis 2 ovatis, .5 mm. longis, sepalis 1.5 mm. longis imbricatis apice purpureis, tubo corollæ albido 1.5 mm. longo lobis tubo æquilongis obtusis intus parce pilosulis, filamentis planis infra ovarium affixis a tubo separatis coquo æquilongis, antheris paulo exsertis erectis prope basin dorsifixis distincte 2-locularibus, disco hypogyno annulari sinuoso, ovario 5-loculato, stylo brevi.

Small shrub about 15 cm. high, with virgate, glabrous branches. Leaves 5-8 mm. long, lanceolate, rigid, acute, concave, minutely ciliate, rather distinctly 3-ribbed below. Flowers 1-3, sessile, terminating the branchlets, rarely axillary and solitary. Bracts 2, ovate, .5 mm. long. Sepals 1.5 mm. long, imbricate, purplish towards the summit. Tube of the corolla whitish, 1.5 mm. long, lobes as long as the tube, blunt, inside scantily beset with hairlets. Filaments flat, inserted below the ovary, quite separated from the tube, and equal to it in length. Anthers slightly exserted, erect, distinctly

2-celled, dorsifixed near the base of the anther. By a bend of the filament at the top, which is there beset with a few hairs, the anther projects forward into the throat of the corolla tube. Hypogynous disc annular, sinuous. Ovary 5-celled. Style short.

Brisbane Ranges, about twelve miles south-west of Bacchus Marsh, Victoria; H. B. Williamson, 10th October, 1923.

In placing the new plant in its proper relation to others of the family, the difficulty has been the greater owing to the difference of opinions held by the botanists who have dealt with the group. The division of the family into tribes has been fairly clear and definite. Bentham gives two divisions—*Stypheliae* and *Epacree*—differing in the number of ovules in each cell and in the method of insertion of the style in the ovary. In Engler and Prantl's "Naturalische Pflanzenfamilien," Drude separates *Prionotes* and *Lebetanthus* as a tribe—*Prionotes*—mainly on account of the hypogynous stamens, the principal character on which our new genus is set up. The new plant, however, undoubtedly belongs to the tribe *Stypheliae*, owing to its single pendulous ovules and the continuity of the style with the ovary. In the subdivision of this tribe a good deal of difference of opinion has been expressed. Bentham, in the "Flora Australiensis," enumerates 15 genera. Mueller united 7 of these under *Styphelia* and two others under *Trochocarpa*, and gave in *Frag. Phyt. Aust.*, vol. vi., elaborate and careful reasons for so doing. Drude, in Engler's work, kept these two last separate, and united 5 only of the 7 under *Styphelia*, keeping *Acrotriche* and *Monoloca* apart. Drude's classification has been followed in Maiden's "Census of New South Wales Plants" (1916), while in the "Census of Victorian Plants" published by the Field Naturalists' Club of Victoria (1923) Bentham's arrangement has been adopted.

A Key to the Genera, compiled from Engler's work, is appended, showing the affinities of the new genus to other genera of the tribe. It will be seen that the subdivision of *Styphelia* does not affect the position of the new plant.

The new plant has a remarkable resemblance outwardly to *Leucopogon virgatus*, R. Br., except in regard to its almost glabrous corolla lobes. This may in part account for its being overlooked for so long. It is known also that the locality, though so near to Melbourne, has not been exhaustively searched by critical observers. It seems certain that Baron von Mueller never botanically explored these ranges. If he had, he could scarcely have omitted to collect and record for the south of Victoria *Olearia todockroa*, F. v. M. This Daisy Bush, previously recorded for Eastern Victoria, was found by the writer growing abundantly round the spot where the new species was gathered.

KEY TO GENERA.
FAMILY EPACRIDACEÆ.

TRIBE STYPHELIÆ.

A. Corolla tube, 4-lobed, stamens 2 .. **OLIGARRHENA**
Corolla, tube, 5-lobed, stamens 5 .. **B.**

B. Corolla broadly cylindrical, divided to the middle into 5 lobes, tips infolded in bud .. **NEEDHAMIA**
Corolla tubular, lobes simply valvate or imbricate .. **C.**

C. Stamens fixed below the ovary, filaments flat, as long as the tube, anthers almost basifixied, distinctly two-celled .. **CHORISTEMON**
Stamens fixed on the corolla tube, usually above the middle, filaments terete (ex. some *Astroloma*), anthers not distinctly two-celled, dorsifixied towards the apex .. **D.**

D. Drupe with endocarp separable into distinct pyrenes .. **E.**
Drupe with solid bony endocarp and several-celled nucleus .. **F.**

E. Ovary 5-celled, with 5 pyrenes .. **PENTACHONDRA**
Ovary 10-celled, with 10 pyrenes .. **TROCHOCARPA**

F. Anthers fixed above the base, deeply divided above into two lobes, corolla cone-shaped at the summit .. **CONOSTEPHİUM**
Anthers fixed at the base, movable, mostly undivided .. **G.**

G. Corolla lobes imbricate in bud, tube with reversed hairs inside .. **BRACHYLOMA**
Corolla lobes valvate in bud .. **H.**

H. Anthers connate, surrounding the style .. **COLEANTHERA**
Anthers not connate into a tube .. **I.**

I. Corolla lobes at the tip bristly-bearded with reversed hairs .. **ACROTRICHE**
Corolla lobes glabrous or on the inside towards the throat densely beset with hairs .. **J.**

J. Ovary 1 or 2-celled, 1-seeded .. **MONOTOMA**
Ovary 5-celled, seldom less by abortion .. **K.**

K. Anthers exserted .. **L.**
Anthers wholly or partially enclosed .. **M.**

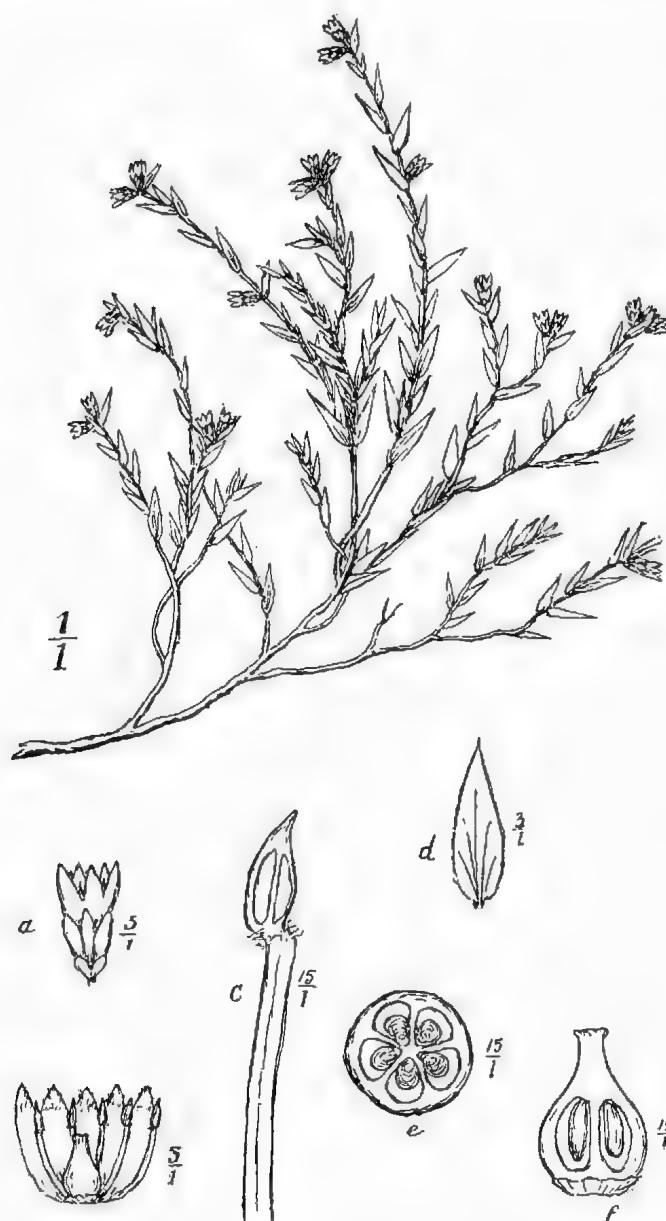
L.	Anthers free	...	...	...	STYPHELIA
	Anthers connivent or connate, enveloped with the filaments in a dense wool	..	..	..	ASTROLOMA
M.	Cotolla tube short, with 5 glandular scales inside below the middle	..	..	..	MELICHRUS
	Cotolla lobes glabrous	..	..	..	N.
	Cotolla lobes bearded inside	..	..	..	LEUCOPOGON
N.	Drupe with a several-celled hard nucleus, the mesocarp very pulpy; flowers usually solitary, with imbricate bracts	..	..	..	CYATHODES
	Drupe with a several-celled nucleus, the meso- carp moderately pulpy; flowers in spikes or racemes, the bracts and bracteoles distinct	..	..	..	LISSANTHE

It should be noted that in *Oligarrhena* and *Needhamia* the stamens are inserted on the corolla tube, so that in the method of insertion of the stamens and the attachment of the anther to the filament the new genus stands quite apart from all other plants of the tribe.

EXPLANATION OF PLATE.

a, flower; b, flower opened up; c, stamen; d, leaf; e, cross-
section of ovary; f, longitudinal section of ovary.

MILLIPEDE.—The millipede exhibited at the November meeting was from the Yodda Valley, Papua. These creatures belong to the Order Chilognatha of the Myriapoda. Millipedes have two pairs of legs on each of the body segments, except on the first three. In this they differ from the Chilopoda, or centipedes, as the latter have only a single pair of legs on each segment. Centipedes are predatory, feeding mostly on insects or other small game; the millipedes, on the other hand, mostly feed on vegetable matter that is more or less in a state of decay, although some of the smaller species in Victoria are often very destructive to young plants, especially when the latter are growing on well-manured, loose soils. Most species of millipedes have rounded bodies with numerous feeble legs; some species are also supplied with stink glands as a means of defence. My friend who captured the specimen exhibited to-night informs me that the Papuans are very much afraid of these millipedes, believing that the fluid ejected from the stink glands of these creatures will cause blindness should any of it come into contact with the human eye.—H. W. DAVEY, F.E.S.



H.B.W. del.

CHORISTEMON HUMILIS, Williamson, n. sp.

The Victorian Naturalist.

VOL. XL.—NO. 12.

APRIL 10, 1924.

NO. 484.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 10th March, 1924.

The president, Mr. C. Daley, B.A., F.L.S., occupied the chair, and about sixty members and visitors were present.

REPORTS.

A report of the excursion to Lilydale on Saturday, 1st March, was given by the leader, Mr. F. Chapman, A.L.S., who said that quite a large party assembled for the purpose of visiting the Cave Hill limestone quarry. This is a favourite hunting-ground for geologists, but unfortunately the material is very hard, and requires considerable labour and skill to secure presentable specimens; however, a number of interesting species were collected, and a profitable afternoon spent.

ELECTION OF MEMBERS.

On a ballot being taken, Mrs. Hannah Hassfield, 12 Jackson-street, St. Kilda; Mr. Leonard Allen, The Ridgeway, Ivanhoe; and Mr. Ernest G. Woods, 8 Morang-road, Hawthorn, were duly elected as ordinary members, and Mr. E. Paul, 12 Virginia-street, Geelong, as a country member of the Club.

GENERAL BUSINESS.

The chairman referred to the approaching departure of Mr. A. E. Keep, on a visit to England, and wished him *bon voyage* on behalf of the Club. He said that Mr. Keep would be given a letter of introduction to the Selborne Society of London. Mr. Keep, in replying, said that he trusted to have a pleasant time in England, and hoped that on his return he would be able to interest the members in his travels.

The chairman also said that, owing to her change of residence from Melbourne to Sydney, the Club would shortly lose Mrs. Shiels as a member. He trusted she would find the outings of the local naturalists' society of equal interest to those of the Melbourne society.

PAPER READ.

By Mr. Chas. Oke, entitled "Notes from Natya."

The author said that the paper was based principally on the Club excursion to that district, which is situated on the Murray, near Swan Hill, in September, 1922. He gave brief descriptions of various objects met with, principally entomological, of which he exhibited a fine series in illustration of his remarks.

Messrs. H. B. Williamson, F.L.S., F. E. Wilson, and others

joined in a short discussion which followed the reading of the paper.

EXHIBITS.

By Mr. A. G. Brown, LL.B.—Bud and flowers of the Western Australian Gum, *Eucalyptus cornuta*, Lab.

By Mrs. E. Coleman.—Flowers of the orchids *Prasophyllum despectens*, Hk. f., and *Chiloglottis reflexa* (*diphylla*), from Healesville (9th March, 1924); *Prasophyllum Archeri*, Hook f., from Blackburn (10th March, 1924).

By Mr. F. Chapman.—Silurian fossils collected during excursion to Cave Hill, Lilydale — viz., *Clathrodictyon*, sp., a stromatoporoid usually forming bun-shaped masses in Palæozoic coral reefs, and showing a laminar and pillar structure. In this genus the pillars are discontinuous with those of the succeeding layers; *Cælocaulus apicalis*, Chapm., a Murchisonia-like snail with a slit-band and hollow columella (hence the generic term); also a giant slug, from Balwyn—the introduced Black Slug, *Arion ater*. This specimen measures five inches in length, and may be regarded as a gerontic or senile example. The skin in this species is reddish or greyish-black, and wrinkled, and the shell (concealed) composed of loosely-aggregated calcareous particles. Feeds irrespectively on cabbages, fruit, common earthworms, or its own kind. The specimen exhibited was found amongst the tomatoes.

By Mr. J. A. Kershaw.—Egg of Carpet Shark, *Cephaloscyllium laticeps*, Dumerill, from Tasmania.

By Mr. V. Miller.—Volcanic matter from Tower Hill, Koroit.

By Mr. C. Oke.—Insects from Natya, in illustration of paper.

By Mr. E. E. Pescott, F.L.S.—Specimens of Privet and Caraway, from Mildura, and English Soy, from Macedon, each infested with Dodder, *Cuscuta europaea*, from Mildura; flowering specimens of Darling Lily, *Crinum flaccidum*, Hook, from Mildura.

By Mr. F. Pitcher.—Flowers and fruiting stems of Erect Clematis, *C. glycinoides*, grown at South Yarra.

By Mr. W. H. A. Roger.—"Ribbon stones" found at Anthony's Lagoon, Northern Territory; also a similar stone, cut and polished, mounted as a brooch.

By Mr. J. Searle.—Sagitta, or "Arrow Worms," known to local fishermen as "Needles"; Apendicula, larvæ of Sea-squirt; Pelagic mollusca (Pteropoda).

By Mr. L. Thorn.—Moonlight-blue Butterfly, *Miletus delicia*, *delos*, with eggs, larva, and pupa.

By Mr. H. B. Williamson, F.L.S.—Dried specimens of *Tribulus terrestris*, Lin., "Caltrop"; *Solanum esculentum*, Lindl., collected at Koondoomoo, near Cobram, by Miss Parsons, February, 1924; *Centaurea nigra*, L. (introduced), collected on Woods' Point road by Rev. A. C. F. Gates, M.A.; *Eragrostis diandra*, Close-

headed Love-grass, *Sporobolus virginicus* (L.), Kunth., var. *pallida*, Pale Rat-tail Grass, *Lipocarpha microcephala* (R. Br.), Kunth., Button Rush, *Imbristylis cestivalis*, Vahl., Summer Fringe-rush, *F. sonarrosa*, Vahl., Veiled Fringe-weed, and *Cyperus difformis*, L., Variable Leaf-rush, all collected at Mildura by Messrs. E. E. Pescott and C. French, jun.

After the usual conversazione the meeting terminated.

EXCURSION TO LILYDALE.

THE objective of this excursion on Saturday, 1st March, was the Cave Hill limestone quarry. This was last visited by the Club about four years ago. On the present occasion we happened to experience a rather warm day, which was, later in the afternoon, tempered by a gentle breeze. The party, which numbered twenty-six, explored, with the greatest interest, the utmost recesses of this wonderful exposure of fossiliferous limestone. At the entrance to the quarry, looking down into the great excavation, the leader pointed out some of the features of the limestone—its coral reef nature, the highly tilted beds, and the eroded surface after uplift. Looking across the quarry there was seen, on the opposite side, a wide U-shaped mass of decomposed basalt, which represented the sectional view of a lava stream that had flowed down an old creek-bed, traversing the limestone area in pre-Miocene times of more than three million years ago—an episode of yesterday compared with the coral reef formation of the main part of the quarry. These facts at once deprive Tutankhamen of the slightest claim to antiquity. Later on we found some fallen blocks of the decomposed basalt, which showed, towards the centre of the bomb-like masses, a nucleus of dense, crystalline rock. The members then descended to the middle quarry and collected from the heaps of limestone, which, however, yielded only the Honeycomb Coral, *Favosites*. The floor of the quarry can now, apparently only be reached by the truck line, and, although the descent was difficult and anything but a demonstration in eurythmics, the effort was worth while, for some beautifully-weathered surfaces of the old Silurian limestone were discovered. These revealed, as in a picture, the perfect structures of corals, hydrozoa, and calcareous plants, once imbued with life in the Lilydale sea-bed. Some of the grey, friable limestone was secured for breaking down, in hope of finding further specimens of Ostracoda, such as were described in 1903 in the *Proc. Roy. Soc. Vict.* Amongst the fossils found were:—CORALS.—*Favosites grandipora*, *Cyathophyllum* sp., *Crenites* sp. HYDROZOA.—*Clathrodictyum* sp., and other forms of stromatoporoids, including examples showing *Caenopora* tubes. GASTEROPODA.—*Euomphalus northi*, *Calocaulus apicalis*.—E. CHAPMAN.

NOTES ON THE ORCHIDS OF VICTORIA.

No. II.

BY EDWARD E. PESCOTT, F.L.S.

(Read before the Field Naturalists' Club of Victoria, 14th Jan., 1924.)

My last "Notes" were published in the *Victorian Naturalist* for January, 1921 (vol. xxxvii., p. 109). These included lists and brief descriptions of thirty-three new species, several new to science, which had been recorded by various collectors since the publication of the first list of the Plant Names Committee in July, 1911.

Since 1921 several new species and varieties have been collected, and several changes have been made in nomenclature. Some of these are new species.

LITERATURE.—No new Victorian literature has been published, but in Part I. of J. M. Black's "Flora of South Australia" Dr. R. S. Rogers, M.A., has written the section on "Orchids"; and as many of our orchids occur also in South Australia, this volume is especially valuable to Victorians. The descriptions are very full, meanings of the names of genera and species are given, and the pages are well illustrated.

CHANGES OF NOMENCLATURE.—It is inevitable that, as botanical research continues, changes of names should follow, for the law of priority of naming demands that the first name given to a particular species shall be its recognized name. Under this law the following changes have been made:—

The genus *Drakaea* becomes *Spiculæa*. Thus, our Victorian species are *Spiculæa irritabilis* and *S. Huntiana*.

Pterostylis præcox, Lindl., becomes *P. ulata*, Reich.

Chiloglottis diphyllea, R. Br., becomes *C. reflexa*, Cheel. It is worth noting that this orchid, which for many years was only collected in autumn, has been found in a few cold localities in spring.

The above changes are recorded in the recently-issued "Census of the Plants of Victoria."

In a paper recently published in Fedde's "Repertorium Specierum Novarum Regni Vegetabilis," published in March, 1923, R. Schlechter gives a revision of the genus *Corybas*, Salisbury, equal to *Corysanthes*, R. Br. If this revision holds, *Corybas* being the prior name, that must stand as the genus name for all of our *Corysanthes*. The following will be the changes:—

Corysanthes bicalcarata, R. Br., becomes *Corybas aconitiflorus*, Salis.

C. fimbriata, R. Br., becomes *C. fimbriatus*, Rchb.

C. pruinosa, R. Cunn., becomes *C. pruinosis*, Rchb.

C. unguiculata, R. Cunn., becomes *C. unguiculatus*, Rchb.

The genus *Corysanthes* (*Corybas*) extends from the Himalayas and Borneo through the intervening islands to Papua, Australia, Samoa, Tahiti, New Hebrides, New Caledonia, New Zealand, and Tasmania.

It was decided that no varieties of species should be included in the "Census of the Plants of Victoria"; thus, *Prasophyllum album*, Rogers, has been omitted from the list, as Dr. Rogers has reduced it to a variety of *P. odoratum*, Rogers.

NEW RECORDS.—The following orchids have been recorded as "new" for Victoria, having previously been known in other States:—

Calochilus cupreus, Rogers, collected in the Grampians by J. W. Audas, F.L.S.

Thelymitra megalyptera, Fitz., collected in the Grampians by J. W. Audas, F.L.S.

Microtis parviflora, R. Br., collected in various parts of the State by several collectors.

Corysanthes (*Corybas*) *bicalcarata*, R. Br., collected at Healesville by Mrs. E. Coleman. It is readily recognized by the two white spurs.

Caladenia iridescens, Rogers, first collected by the writer in the Grampians; subsequently found in the south as well. Its bronzy, metallic appearance is remarkable.

Caladenia pumila, Rogers.—This is a dwarf, hairy species, of low growth, with an unusually large flower for its size, being very open and white, with wide florets. It was sent to the writer from Bannockburn.

Caladenia reticulata, Fitz., is found in several localities in the south and east. The purple veining on the labellum, which is serrated on the edge, is very distinct. It belongs to the *C. Patersoni* group.

Pterostylis cycnocephala, Fitz., is an old species which has been confused with *P. multica*, R. Br. The latter is much more dwarf than the former. It has the labellum appendage pointing backwards, while in the former, which is a stout species, the appendage is pointing forwards.

SPECIES NEW TO SCIENCE.—Five species new to science have been found in Victoria, as well as several varieties.

Prasophyllum Braineri, Rogers, was collected at Ringwood by Mr. C. French, jun., and the writer. It is of medium growth, green in colour, and distinctly fragrant. It is named after Arthur B. Braine, an orchid collector.

Dr. R. S. Rogers, M.A., read a paper before the Royal Society of South Australia on 11th October last on new Australian records. He has courteously supplied the following details of four new Victorian species:—

Prasophyllum Colemanae, Rogers.

This handsome species reaches a height of nearly 18 inches. The flowers are conspicuous, with rather large flat lilac labellum and blunt lilac petals. The paired sepals do not cohere, and are widely separated. The membranous portion of the labellum is very voluminous, and there is very little flexion in that segment.

It is named after Mrs. Edith Coleman, its discoverer, and was collected by her at Bayswater. It is a late bloomer.

Prasophyllum Tadgellianum, Rogers.

This is an alpine species, published as a variety of *P. Frenchii* by Rogers in *Trans. Roy. Soc. S.A.*, 1922, but now raised by him to specific rank. The flowers are mainly red-streaked, sometimes green or maroon-coloured. The labellum is unusually wide and semicircularly recurved. It has sometimes conspicuous chocolate markings upon it. Its lateral sepals, unlike those of *P. Frenchii*, are connate.

It was first reported by Mr. A. J. Tadgell (in whose honour it is named) in December, 1914, from the Victorian Alps, and subsequently by Dr. Green from Mount Kosciusko (7,300 feet), in December, 1921. It has not been found lower than 5750 feet.

Microtis oblonga, Rogers.

This species is by no means uncommon, and is known to occur in South Australia as well as in Victoria. In the latter State it has been received from the following localities:—Cravensville, Braine; Ringwood, Braine; Healesville, Mrs. Coleman, Ferntree Gully, Pescott; Grampians, C. W. D'Alton. Its name has reference to its oblong labellum, and it occupies a place midway between *M. porrifolia* and *M. parviflora*. It is often tall, very slender, with an attenuated inflorescence, the flowers of which are quite small. The labellum is long, and, unlike that of *M. parviflora*, has a marked callosity at the tip in addition to the two basal ones; the tip is never deeply emarginate as in *M. porrifolia*. The ovary is long and slender, and quite unlike that of the latter species.

The plant is quite distinctive and easily recognized. It will probably be reported from many new stations.

Pterostylis decurva, Rogers, approaches closely to *P. obtusa*, but blooms in the same locality as the latter in November instead of April. The apex of the galea is prolonged into a very long depressed or decurved point, from which feature the name is derived. It was first reported from Lower Ferntree

Gully, Pescott; Ringwood and Belgrave; Pescott and A. N. Burns.

NEW VARIETIES.—Two new varieties have been named by Dr. Rogers, both having been collected at Alberton by Mr. A. J. Tadgell.

Prasophyllum australe, R. Br., var. *viscidum*, Rogers.—It is a slender plant, with small dark red or prune-coloured flowers, with dark blotches, and being very viscid.

Caladenia carneae, R. Br., var. *aurantiaca*, Rogers, is a slender variety, the white perianth segments being striped with green on the outside. The labellum is pure white, with the exception of the tip, which, with the calli, are deep orange in colour. The calli are in two rows.

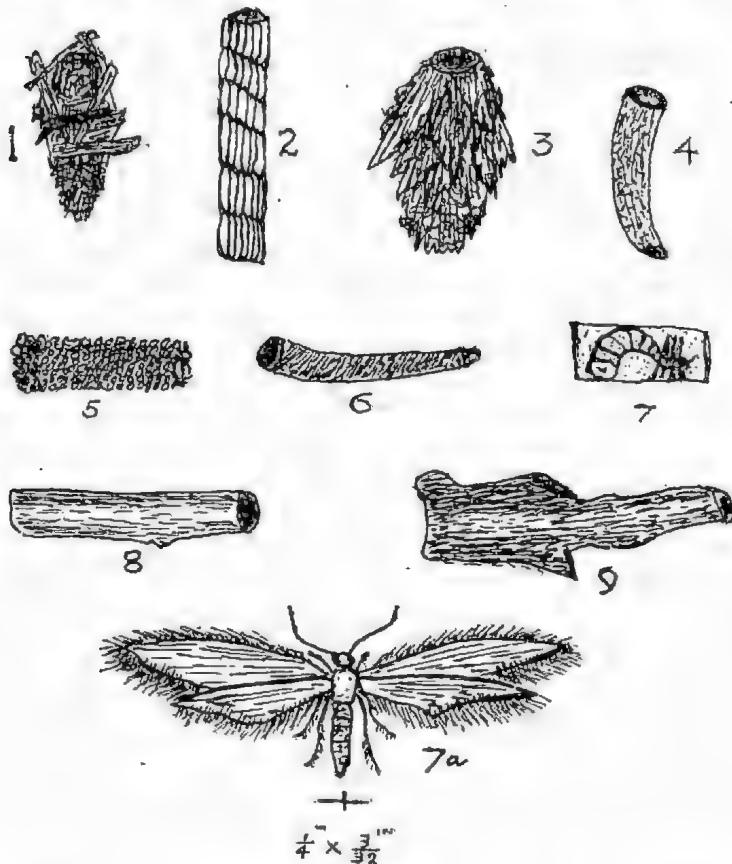
COLOUR.—Reference may be made to our last notes, wherein it was stated that "it is the structural form, and not the colour, of the flower, that determines the species." This year several almost pure white flowers of *Thelymitra epipactoides*, F. v. M., were collected in the Queenscliff district.

AQUATIC HOUSE-BUILDERS.

THERE is a small but interesting group of insects inhabiting our ponds and streams, the adult members of which are seldom seen among collections of insects; and the young entomologist who will take up the study of these is sure of a greater reward in the way of new species than he who spends his time on the better-known orders, such as Lepidoptera or Coleoptera. The insects alluded to are the Caddis-flies. At one time they were thought to be a family of the Lepidoptera, on account of their wings being covered with hairs; other entomologists thought they should be placed in an order by themselves, which they called Trichoptera, or hairy-winged. At present they are included in the Neuroptera as a special family called Phryganidae. Caddis-flies are dull-coloured, sluggish insects, resting or hiding among the foliage surrounding the pools or streams by day and taking flight as the evening merges into twilight and darkness. Their eggs, when laid, are covered with a glutinous substance which swells out on coming in contact with water, in a similar way to those of the gnats, forming, in some species, strings of eggs; in other species they have a flattened, disc-shaped appearance; but in every case the young larvae, as soon as hatched, begin to make protecting cases for themselves. These cases are very varied in shape and mode of construction.

Some are an untidy collection of rubbish loosely fastened together (fig. 3); in others the material is arranged neatly in symmetrical tubes (figs. 1 and 2). Some compose their cases of

grains of sand (fig. 5), others of shells of *planorbis* and other snails. A small species I took in numbers on the Baw Baw plateau composed their horn-shaped cases of shining fragments of mica (fig. 4), and looked like living, iridescent gems as they moved along the bed of the small streamlet. A very similar caddis-worm with a case of the same shape, but composed of some dark substance, is common in the lake of the Botanical Gardens (fig. 6). Sometimes the caddis-worm will take



weight that could not be moved on land is easily carried about in the water. In moving about, the head and thoracic segment bearing the legs alone are protruded from the case, and they sometimes swim through the water by rapidly vibrating this portion of their bodies. These segments have a chitinous covering and are blotched or mottled with a dark pigment; the rest of the worm, which is protected by the case, is lighter in colour, and is a tempting, succulent morsel for fish and aquatic carnivora. Just behind the mandibles with which the mouth is provided is the spinnerette, connected with a gland from which is secreted the fluid that makes the silken web used in lining the cases and binding their material together. A pair of legs is attached to each of the three thoracic segments. The first abdominal segment has two lateral processes and a dorsal tubercle; this latter can be protruded and retracted at will, and these three processes, together with the two strong hooks at the anal end of the larva, serve to hold the case securely. The remaining abdominal segments have branchial processes, varying in shape and number in different species, which enable the larva to keep its blood supplied with oxygen. An undulatory motion of the abdomen causes a stream of water to flow through the tube, bringing oxygen to these filaments. When preparing to pupate the larva spins a silken network over the openings at each end of the case, which protects it from the attack of foes, while at the same time allowing the water free access, so that the breathing process may not be interfered with. The larva then casts its skin and becomes a pupa possessed of large, sickle-shaped mandibles—not for devouring food, for the insect does not eat at this stage of its life-history, but for breaking away the silken partition closing the tube, so that when its metamorphosis is complete the imago may have free access to the aerial world. Having freed itself from its case, the pupa, braving the dangers besetting it on all sides from aquatic carnivora, climbs out of the water and rests on some stone or water plant until its skin dries and splits, allowing the perfect insect to emerge, and, after drying its hairy wings, devote the rest of its short life to mating and depositing its eggs.

All caddis larvæ do not construct cases; there is at least one species found among willow roots and other vegetation, carnivorous in its habits, that simply spins a loose web, like a spider, and lies in wait for some unwary insect to blunder into its snare, when its strong mandibles soon complete the tragedy. *Chironomus* larvæ seem to be its favourite diet.

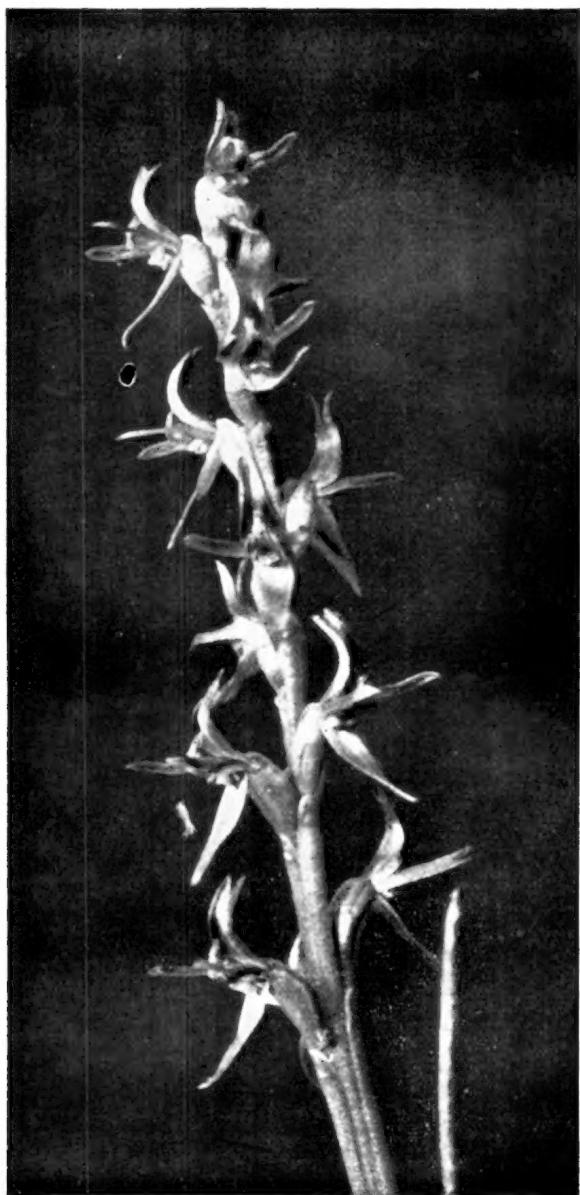
The smallest species of caddis larva I am acquainted with is frequently taken among *spirogyra*, &c. It makes a flat case of silk, about three-sixteenths of an inch in length, through

the transparent walls of which the larva may be seen (fig. 7). The head and throat are remarkably thin and the legs very slender, but the abdominal segments gradually increase in size towards the anal end, and are curved, giving the larva a hunched and crowded appearance when at rest in its case. When about to pupate it fastens its case by the four corners to the vegetation, or on the sides of the aquarium. The imago (fig. 7a) is so remarkably like a plumed winged moth that it might easily be mistaken for a specimen of micro-lepidoptera. Its wings, when expanded, measure a quarter of an inch from tip to tip, and are deeply fringed, while the body is less than one-eighth of an inch in length.—J. SEARLE.

EARLY ORCHIDS.—Owing, no doubt, to the unusual rainfall during January, several orchids have appeared earlier than recorded in my notes for the last four years. On 21st February blooms of the Blunt-tongue Orchid, *Pterostylis obtusa*, were found at Ferntree Gully three weeks earlier than previously recorded; while the Autumn Bird-orchid, *Chiloglottis diphylla*, was found in flower at Healesville on 20th February, two months in advance of my earliest record. The conditions appear to be especially favourable to this orchid, for yesterday I found dozens of blooms where ordinarily I would have found only one or two on the corresponding date.—E. COLEMAN, Blackburn, 16th March, 1924.

PRASOPHYLLUM TADGELLIANUM, Rogers.—This orchid, first found by Mr. A. J. Tadgell, in 1914, on Mount Bogong, North-Eastern Victoria, was recorded by Dr. R. S. Rogers, of Adelaide, as a variety of *P. Frenchii*, and so described in the *Trans. Royal Society of South Australia*, vol. xlii. (1922); but from the consideration of further material he has decided to raise it to specific rank under the name of *Prasophyllum Tadgellianum* (*Trans. Roy. Soc. S. Aust.*, vol. xlvi., 1923). This orchid, which is illustrated on plate xviii. (enlarged to twice its natural size), is stouter than *P. Frenchii*, has a very wide labellum, which is not laterally contracted as in that species, while the lateral sepals are consistently connate. The flowers are pale greenish-yellow, or yellow with chocolate markings down the middle of the perianth segments, also down the middle and on the sides of the labellum, the chocolate markings giving the flowers a very distinctive appearance. The callous part of the labellum is much wider than the membranous portion. It is found only in alpine situations, and is recorded from Mounts Bogong and Hotham (Victoria) and Kosciusko (New South Wales). It flowers in January and February. It will be known as the "Bogong Leek-Orchid." The illustration is from a photograph by Mr. T. Green.

PLATE XVIII.



PRASOPHYLLUM TADGELLIANUM, Rogers. $\times 2$.

Photo. T. GREEN.

CENSUS OF VICTORIAN PLANTS.

SUPPLEMENT NO. 2.

THE following additions and alterations have been made to the "Census of Victorian Plants" by the Plant Names Committee of the Field Naturalists' Club of Victoria:—

ADDITIONS.

Page 10.— <i>Poa Labillardieri</i> , Steud.	Blue Tussock-grass	S.W., E.
" 18.—* <i>Prasophyllum album</i> , Rogers	White Leek-Orchid	S.
" 18.—* " <i>Tadgellianum</i> , Rogers Bogong Leek-Orchid	Bogong Leek-Orchid	N.E. (Mt. Bogong, A. J. Tadgell)
" 28.—* <i>Kochia excavata</i> , J. M. Black	Bottle Blue-bush	N.W.
" 29.— <i>Ranunculus Muelleri</i> , Benth.	Felted Buttercup	N.E. (Mt. Bogong, A. J. Tadgell)
" 35.— <i>Pultenaea acerosa</i> , R. Br.	Bristly Bush-Pea	S.W. (Grampians, J. W. Audas and C. D'Alton).
" 52.—After <i>Cyathodes</i> add—		

**Chorizemeton*—

<i>humilis</i> , H. B. Williamson	Anakie Heath	S. (Brisbane Range, H. B. Williamson)
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* New to science.

NEW LOCALITIES.

Page 2.— <i>Notholana distans</i> , R. Br.	Bristly Cloak-fern	S. (Dandenong R'ges, F. G. A. Barnard, 1903; Kellor, A. J. Tadgell, 1923)
" 7.— <i>Panicum prolatum</i> , F. v. M.	Palid Panic-grass	S. (Lara, Rev. A. C. F. Gates, M.A.)
" 8.— <i>Amplipogon strictus</i> , R. Br.	Grey-heard Grass	E. (Sale, H. B. Williamson, F.L.S.)
" 10.— <i>Diplachne loliiiformis</i> , F. v. M.	Rye Beetle-grass	S. (Lara, Rev. A. C. F. Gates, M.A.)
" 12.— <i>Cladium articulatum</i> , R. Br.	Jointed Twig-rush	E. (Sale, H. B. Williamson, F.L.S.)
" 35.— <i>Pultenaea laxiflora</i> , Benth.	Loose-flower Bush-Pea	S. (Brisbane Range, C. S. Sutton, M.B.)
" 56.— <i>Echirichium australasicum</i> , D. C.	Hairy Forget-me-not	E. (Newry, Miss N. Curtis)
" 58.— <i>Anthocercis Eadesii</i> , F. v. M.	Large-leaf Ray-flower	N.W. (Mt. Arapiles, C. D'Alton)
" 61.— <i>Isotoma axillaris</i> , Lindl.	Rock Isotome	E. (Newry, Miss N. Curtis; Nowa Nowa, F. G. A. Barnard)
" 63.— <i>Olearia iodochroa</i> , F. v. M.	Violet Daisy-bush	S. (Brisbane Range, Rev. A. C. F. Gates)
" 67.— <i>Rutidosis leptorrhynchoides</i> , F. v. M.	Button Wrinkiewort	E. (Newry, Miss N. Curtis)

CORRECTIONS.

Page 30.—For "Casytha" read "Cassytha."	
" 55.—For "Tylophora" read "Tylophora."	
" 83.—For "Violet Periwinkle" read "Common Violet."	

NOTE.—Supplement No. 1 in *Victorian Naturalist*, December, 1923 (vol. xl., p. 147).

Field Naturalists' Club of Victoria.

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1891-2—Prof. Baldwin Spencer, M.A.	1913-14 (3 months)—J. A. Leach, M.Sc.
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1893-4—H. T. Tisdall, F.L.S. (d).	1914-15—J. A. Kershaw, F.E.S.
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1897-8—C. French, F.L.S.	1918-19—A. D. Hardy, F.L.S.
1898-9—C. French, F.L.S.	1919-20—A. D. Hardy, F.L.S.
1899-1900—J. Shephard.	1920-21—J. Gabriel (d).
1900-1—J. Shephard.	1921-22—F. Chapman, A.L.S.
1901-2—T. S. Hall, M.A. (d).	1922-3—C. Daley, B.A., F.L.S.
	1923-4—C. Daley, B.A., F.L.S.

(d) Now deceased.